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ALASKA AGRICULTURAL EXPERIMENT STATIONS.

C. C. GEORGESON, Special Agent in Charge.

ANNUAL REPORT

OF

ALASKA AGRICULTURAL EXPERIMENT STATIONS

FOR

1906.

UNDER THE SUPERVISION OF

OFFICE OF EXPERIMENT STATIONS,

U. S. DEPARTMENT OF AGRICULTURE.

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ALASKA AGRICULTURAL EXPERIMENT STATIONS, SITKA, KENAI, COPPER CENTER, AND RAMPART.

[Under the supervision of A. C. True, Director of the Office of Experiment Stations, United States Department of Agriculture.]

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LETTER OF TRANSMITTAL.

SITKA, ALASKA, *February 6, 1907.*

SIR: I have the honor to submit herewith the annual report of the agricultural experiment stations of Alaska for the year 1906.

Very respectfully,

C. C. GEORGESON,
Special Agent in Charge of Alaska Investigations.

DR. A. C. TRUE,
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Publication recommended.
A. C. TRUE, *Director.*

Publication authorized.
JAMES WILSON, *Secretary of Agriculture.*

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BRIEF SUMMARY OF WORK.

By C. C. Georgeson, *Special Agent in Charge.*

SITKA STATION.

The plans outlined in former reports have been followed. That is to say, the work at this station has been along horticultural lines. Sitka Station is the main station only in the sense that it is the headquarters from which the work of the other stations is directed.

Grain growing is no longer attempted here. Our experiments have proved that the coast region is not well adapted to the growing of grain. It will mature in most seasons, but the months of August, September, and October are usually so wet that as a rule it is almost impossible to save the crop. This fact is sufficient to deter farmers from attempting to grow grain except as a forage crop; but aside from this there is in the coast region but little land adapted to the cultivation of grain. The numerous small valleys, coves, and pockets do, however, afford splendid locations for gardens. Our efforts are devoted, therefore, chiefly to the things that are likely to succeed in the region represented by this station, namely, vegetables, berry fruits, and probably some varieties of tree fruits.

Perhaps the most important feature of the work has been the propagating, cultivating, and distributing of nursery stock. There are growing a few trees of each of some thirty varieties of apples, with a view to studying their behavior. For this purpose there have been selected the hardiest varieties known, which at the same time mature their fruit early. Only early maturing sorts will succeed. Varieties which are summer apples in the States will be fall apples in Alaska, and those which are fall apples in the States will not mature at all in Alaska. The summer heat is not great enough. In the coast region the season between frosts is long—longer, indeed, by at least two months than in the northern tier of States.

[a] Previous reports were issued as U. S. Dept. Agr., Office of Experiment Stations Buls. 48, 62, 82, 94, and 169, and Ann. Rpts. 1901, pp. 239–359; 1902, pp. 233–307; 1903, pp. 313–389; 1904, pp. 265–360.

In the larger portion of the coast region there is little, if any, damaging frost between May 1 and October 1, and some seasons damaging frosts do not occur until the end of October. The drawback to the climate in this region lies not in too great cold, but, anomalous as the statement seems, in the lack of summer heat. On the warmest summer day on record at Sitka the thermometer reached 87° F., but this was exceptionally hot. The maximum temperature is more generally between 60° and 70°, and some summers it will not go much above 60°. In the interior, on the other hand, the summers are warm enough, at least in places, but the season is too short to hope to mature any but the earliest sorts, and there is considerable doubt if they will succeed. Details of the growth of the fruit trees which we have attempted to cultivate are given herewith.

Another feature of the work is the propagation and distribution of fruit trees and fruit bushes in order that they may be tested in other parts of the Territory. During the two years 1905 and 1906 there were distributed 6,794 trees and fruit bushes to 312 addresses. This number consisted of 2,716 apples trees in about 30 varieties, 2,204 currant and other fruit bushes, and 1,874 raspberry plants. Records are kept of the persons to whom they are sent, as well as of the varieties sent to each, and in due time a call will be made for detailed reports of the behavior of all of these fruits and plants. It is too early yet to begin to look for results. The writer thinks this distribution of much importance. It is the only means by which extended tests can be made of the adaptability of the different varieties to the conditions of the Territory, as a whole, to the growth of fruits of any kind.

Unfortunately comparatively few trees have been sent to the interior, for the reason that the postal facilities do not admit of the transmission of packages through the mails except during the summer season, when the mails are carried by river navigation, and live trees can not well be sent at that season, especially as they must be in transit for a month or six weeks, but it is expected in time to get a number of trees started in that region also.

There is a native crab apple (*Pyrus rivularis*) in Alaska which may have a possible value as a stock for dwarf trees. It is too small and too slow of growth for standard trees. It grows over a large area in the coast region, in many places forming thickets so dense as to be almost impenetrable. It seldom has a single trunk; usually two or more spring from the same root or branch a few inches above the ground. Its height varies from 10 to 20 feet. It bears its fruit in clusters of little oblong apples which will average smaller than the ordinary sour cherry. Plate I, figure 1, shows a part of a fruiting branch after the leaves have fallen. Small as these apples are, they make a most delicious jelly. A number of varieties of apples have

FIG. 1.—NATIVE ALASKAN CRAB APPLE.

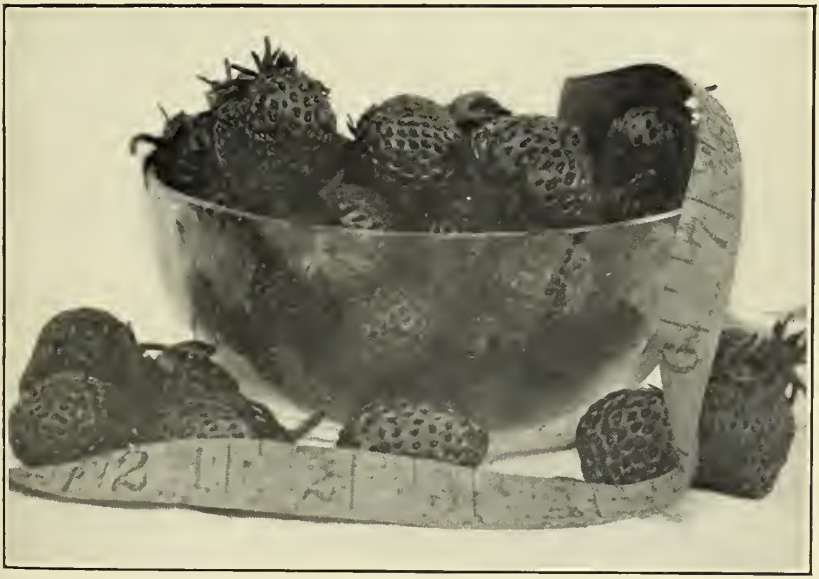

FIG 2.—CULTIVATED NATIVE ALASKAN STRAWBERRIES.

been grafted on this species by various methods. The crown graft appears, so far, to be the most successful, while top-worked trees do fairly well. Plate IV, figure 1, shows a native crab apple top-worked with the Duchess. This appears to be a standard tree. The writer is of the opinion that dwarf trees of all sorts will do better than standards. They have many advantages—they bear earlier, they can be more easily protected if found necessary, they are not so much exposed to the wind, and a very much larger number can be planted in a given area.

Another line of work which it is hoped may result in good for Alaska is an attempt to develop varieties of strawberries and raspberries adapted to the climate by cross fertilizing cultivated varieties with wild native species. The work is new, and there has not yet been time enough to produce results. The cultivated raspberry has been cross fertilized with the salmon berry (*Rubus spectabilis*). The latter, which is the wild raspberry of the coast region, is hardy, a luxuriant grower, adapted to the sour, peaty soil, and has a large and quite palatable fruit. It resembles the raspberry in appearance, but is lacking in flavor and aroma. The fruit is too soft to permit of shipment, but the berry is very large, and the canes are most vigorous growers. Berries as large and even larger than the end of a man's thumb are not uncommon. (Pl. I, fig. 2.) It is hoped that a cross between this and the raspberry may produce a fruit that will be valuable for the coast region of Alaska and possibly for the interior also. The salmon berry blooms about four weeks earlier than the raspberry, and in order to have the plants of the two species bloom at the same time the raspberry canes were planted in boxes and set in the greenhouse in April. By this means their blooming was forwarded enough to correspond with that of the salmon berry. The work is tedious and takes much time. The raspberry blooms, when about to open, were gone over once or twice a day and the anthers removed, and salmon-berry blooms, taken likewise at the right stage, were carried in and used to pollinate the raspberries. Some plants have been raised from the cross fertilization, but they are still small.

In like manner the cultivated strawberry has been cross-fertilized with the pollen from the wild Alaska strawberry. The cultivated berry plants were removed to the greenhouse in order to hasten the blooming period to correspond with that of the native plants and that there might be full control of the pollination. The cultivated berries used were of a pistillate variety, and the blooms were easily fertilized by the pollen of the native plants. As the berries thoroughly ripened the seeds were separated from the pulp and dried. These seeds were planted in flats last fall (1905), remaining out of doors until after thoroughly freezing, when they were removed to the forcing house.

Plate II, figure 2, shows part of the cultivated plants in the boxes in the greenhouse which have been subjected to pollination. The well-formed, regular berries prove that the work was a success. Berries of the same variety grown out of doors without artificial pollination were quite generally deformed and irregular, owing to imperfect pollination.

THE NATIVE ALASKA STRAWBERRY.

It is an interesting fact that there are at least two species of wild strawberries in Alaska, one in the coast region and one in the interior. They differ greatly from each other. That on the coast is a large, vigorous plant, the berries often as large as thimbles, while the species in the interior is a small, smooth plant, with very small berries, the size of peas.

The coast species (*Fragaria* sp.) is found in abundance on the bleak coast from Muir Glacier to Mount St. Elias. It grows in almost pure sand and gravel and disputes the ground with the mosses, grasses, and other plants peculiar to the region. It usually bears fruit in abundance, though some seasons the crop is short. From August 2 to 10, 1906, a party of people from Juneau camped at Point Gustavus, on Glacier Bay. They gathered over 100 gallons of these wild strawberries, which were carried home and preserved by the various arts of the housekeeper. A couple of years ago we procured from Yakutat Beach 150 plants of this berry, which were set out in good garden soil and given the usual culture. The plants grew and propagated with extraordinary luxuriance, but did not produce a single berry. They had been fed on sand and watered by the spray of the sea, and they now made the most of it when put in good soil. Their cultivation came near being abandoned as a failure. A further experiment was made, however, by planting a few hundred plants in some of the poorest soil that could be found. It is a sterile, volcanic sand, and will produce absolutely nothing unless it is fertilized. There these native strawberries felt at home and began to bear fruit. Plate II, figure 1, is a plant in this patch. The leaves were drawn aside for the purpose of exposing the berries to the camera. Attention is called to the fact that the peduncles are short and prostrate, and the berries not only lie on the ground, but bury themselves in it. While in bloom some of them are upright, but these are usually sterile; the fertile flowers lie on the ground.

In going through the patch the casual observer will see no fruit. He must pull aside the tangle of leaves and runners to see the berries. The plants, even on this sterile ground, are vigorous and produce a mass of runners. The leaves are large, on long petioles, woolly, and rather coarse, and a peculiarity which the writer has never seen before either among cultivated or wild strawberry plants is that a very large

FIG. 1.—NATIVE ALASKAN STRAWBERRY UNDER CULTIVATION.

FIG. 2.—CULTIVATED STRAWBERRIES, FERTILIZED FROM NATIVE SPECIES.

percentage of the leaves have four leaflets and some five or six. The leaves are subject to leaf spot, apparently, even more than cultivated varieties. It was found necessary to spray them several times during the season. There is a decided variation among the plants; some are much more productive than others, and some appear to bear only staminate flowers, though, as a rule, the flowers are perfect. They begin blooming some three or four weeks before and continue to bloom and set fruit much later than the cultivated plants. At Sitka the berries begin to ripen the 1st of July.

Plate I, figure 2, shows a bowl filled with these berries. In quality the berry is superior to any cultivated variety that the writer has ever tasted, having a strong, delicious aroma which is that of the strawberry, and yet which differs from that of the cultivated berry. A half dozen berries will fill a room with their aroma. As shown in the illustration, the berry inclines to be conical. It is of a dull red color, is very firm in consistency, and will ship as well as the best cultivated varieties.

It is hoped that crosses between this species and the cultivated sorts may result in something of value.

CURRANTS.

There are several species of Ribes indigenous to Alaska. The most valuable, doubtless, is the large red currant. It grows wild in the mountains on the mainland and in the Kenai Peninsula, but the writer has never seen nor heard of it on any of the islands. In its habitat it is a straggling bush from 2 to 5 feet high. It fruits somewhat sparingly, the racemes are long and loose, and the berries large but somewhat variable in size and shape. In both size and flavor the berries compare favorably with good cultivated varieties, and they are decidedly larger and less acid than the well-known Red Dutch currant. A peculiarity of the species is that about 25 per cent of the berries are pear-shaped, but apparently these are not confined to particular bushes, as they are frequently found on the same bush and sometimes in the same raceme with the round berry. It grows usually in the shade of the woods and in wet soils, where, while exposed to very low temperatures (50° to 60° below zero), it is not exposed to the winds. Its hardy nature and large and excellent berries have induced attempts to bring it under cultivation, but so far without success. Plants which have been dug in the woods and planted at the station have either died or failed to thrive. They appear to be very susceptible to fungus diseases, more so than cultivated varieties. Seed from the wild berry from various sources has been collected and sown. In some cases the seed did not germinate, and in others it produced but a few plants. This year (1906) there was collected more than a half

pound of seed, which was planted in flats in the propagating house. Efforts to bring the species under cultivation will be continued.

There are two species of the black currant which grow plentifully on the islands, but which are rare on the mainland. They are *R. bracteosum* and *R. parviflorum;* both have large and palatable berries and fruit abundantly. No trouble has been experienced in introducing them; they are at home in the region about the station and will grow anywhere, but whether they will be an improvement over varieties now under cultivation remains to be determined by further work.

CRANBERRIES.

After several unsuccessful attempts to make the eastern cranberry grow here, it has been concluded that to experiment further in that line is useless. The so-called Alaska cranberry (*Vaccinium vitis-idæa*) produces a small but very delicious fruit, no larger than a small red currant. The whole plant is of miniature dimensions, stems being only from 4 to 6 inches high. It grows abundantly in the marshes and among the mosses and in wet ground. It does not grow in standing water or even where water occasionally stands, but will grow on old stumps and decayed logs and on little knolls where it is just out of the standing water. The plant has been transferred to the station and planted in rows, which, however, are not cultivated. It thrives and yields fruit like the wild berry in the bogs.

ENLARGEMENT OF THE PROPAGATING HOUSE.

It was noted in the last report that a small propagating house had been built at the Sitka Station. It is a simple lean-to, only 20 feet long. It very soon proved to be much too small to accommodate the propagating work; an addition has therefore been built to it 20 feet long, so that the house now measures 40 feet. It is already full and more room will be needed in the near future.

ATTEMPTS AT BEEKEEPING.

In 1905, with a view to testing the practicability of keeping bees in southeastern Alaska, two stands of bees were procured, through the Bureau of Entomology, from a beekeeper in the State of Washington. The bees were not strong when received, but in a good bee country they would probably have survived and increased. They arrived in June and at once set to work on their search for honey; but as there are not many honey blossoms at that season of the year it soon became apparent that they would have to be fed. From the beginning of August until fall they were fed on a sirup made from granulated sugar. In the early part of November they were removed to a frost-proof cellar. In the spring they were found to be dead.

Some years ago a priest of the Russian Church made a similar experiment on a larger scale, with the same results. Beekeeping can not be made a success in southeastern Alaska.

OFFICE WORK.

The office work is constantly increasing in volume. It is no unusual thing to receive fifty letters in a mail, many of which require extended answers. In addition to this, the correspondence in connection with the weather service and the work as disbursing agent demand nearly all the time of the special agent in charge. The office has never been provided with a permanent clerk. Help for office work has been hired at times, but it is difficult to get competent help. The time has arrived when it will be economy to provide the office with a permanent clerk, in order that the special agent in charge may have more time for experimental work.

COPPER CENTER STATION.

It is with much regret that report is made that Mr. J. W. Neal, who has been superintendent of the Copper Center Station since July 1, 1902, has resigned from the service, his resignation to take effect January 31, 1907. Mr. Neal has been an exceptional man for this trying place. His wife and little child remained at the station for more than four years and were subject to the hardships to which an isolated settler is exposed in that rigorous climate. Mr. Neal has accomplished an enormous amount of work and has done most of it with his own hands, seldom having more than one man to help him. He has cleared and brought under cultivation 40 acres of land and fenced 80 acres of pasture aside from the cultivated land, built a log house, cache, root cellar and shed, blacksmith shop, tool house and barn, and carried out a large number of experiments with grains and vegetables. Eleven acres have been seeded to various species of grass to test their behavior. The labor and hardships connected with hauling a year's supplies each winter over the trail, 105 miles from Valdez, have been detailed in a former report. His report of the season's work is submitted herewith.

Only a small percentage of the grains at the Copper Center Station matured, and that which did mature was sowed in small plats with the earliest seedings. When upward of 30 acres has to be seeded to many varieties and in many plats, with but one team of horses, progress must necessarily be slow, and the later seedings stand but a small chance of maturing before frost. This is what happened the past season. Owing to the dry weather the growth had been slow up to the middle of July, but from that time until the last of August rains were more frequent, and the grain continued

to grow later than usual. The result was that when killing frost appeared on August 24 the grain was still in a growing state and all but the earliest seeded plats were spoiled for seed. The frosted grain, however, was immediately cut for hay, and 20½ tons of this has been sold for a total of $4,152, the price per pound ranging from 7 to 12 cents, according to quality.

These results prove that grain hay can be successfully grown in the interior and that in a location like Copper Center, 100 miles from tide water, good prices can be realized. This grain had not been seeded with a view to growing hay. For that purpose larger growing varieties would have produced a heavier yield and brought a larger profit.

What has been done by the station in this instance can be done equally well and with probably greater profit by any private individual who has the means and the energy to break up a piece of ground and to seed it with oats as a hay crop. If anyone should try, it is recommended that he select a large growing variety and sow from 90 to 100 pounds of seed to the acre. There is but little feed produced in the interior; that for all the horses used in the pack trains and for those used by travelers must be hauled in from tide water, and the price realized represents very largely the cost of transporting it to points where it is wanted. As a matter of fact, $200 a ton for hay is a low price under the circumstances. It would cost more than that to haul a ton over the trail 100 miles from Valdez. Road-house keepers are advertising hay at 20 cents per pound as an especially low rate. The ordinary retail price at that distance from tide water is 25 cents per pound, or $500 per ton.

RAMPART STATION.

It is a somewhat remarkable fact that grain has matured every year at the Rampart Experiment Station since work was begun there in 1900, while at the Copper Center Station, 3½ degrees farther south, only one satisfactory crop has matured during the four years we have been at work there. At the latter place killing frosts have occurred in August—in one year as early as August 14—while at Rampart no killing frosts have occurred before the grain ripened, in the latter part of August. The past season frost did not occur until the beginning of September. We can simply note this fact without attempting to explain the cause. The superintendent of the Rampart Station, Mr. Frederick E. Rader, like Mr. Neal, has done most of the work himself. From July 1 until the close of fall work he has had one man to help him. No additional land has been cleared the past season. He has had his hands full in attending to the crops on that which was already cleared. He has

built a five-room cottage, 28 by 30 feet, upon high ground beyond the reach of floods. The log cabin which has until the present time served as a residence for the superintendent is located on the river bank, and during the spring freshet this cabin has been flooded. Last June the water was 30 inches deep inside, and of course it had to be abandoned for a tent. Mr. Rader has also built a combined log barn and implement shed, 30 by 30 feet. Through the courtesy of the United States Geological Survey, the Rampart Station has been so fortunate as to get a fairly good team of horses without expense. Mr. D. C. Witherspoon, who was in charge of one of the Geological Survey parties in that region, closed the season's work with a number of pack horses on his hands, for which there was no market. He therefore kindly turned the best two horses over to the Rampart Station. Our thanks for this generosity is hereby extended to Mr. Witherspoon and to Mr. Alfred H. Brooks, chief of the Alaska division of the Geological Survey.

A stump puller and a plow have been added to the station equipment, and it is hoped that next year the area under culture may be increased to 10 or 12 acres.

The list of varieties of grain grown there the past season is short, for the reason that a shipment of seed grain ordered sent in during the summer of 1905 failed to reach the station, and was therefore not on hand for spring seeding in 1906. It is a decided disadvantage to the work that everything required by the station must be sent in the year before it is wanted.

A brief detailed report by Mr. Rader is submitted herewith. Special attention is called to the fact that three varieties of winter rye and one of winter wheat lived through the winter and matured grain, although the temperature fell to 70° below zero. They are Amber Winter rye, Giant French Winter rye, and Excelsior Winter rye. The winter wheat is a variety imported from Russia and known as "Kharkov Winter wheat." It is not to be expected that winter grain will always survive. Last year conditions were favorable in that there was a good covering of snow, which fell before severe freezing weather set in.

Of the spring grains, the following varieties matured: Manshury barley, Lapland barley, Two-Rowed barley, Burt Extra Early oats, Finnish Black oats, and a portion of the crop of a variety of Russian buckwheat.

The season was wet for that region, and the spring grains showed a tendency, which has also been observed here at Sitka, of sending out fresh shoots from the roots late in summer. This late growth could not mature and was a detriment to the crop.

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DEVELOPMENT OF EARLY VARIETIES.

One of the lines of experiment which have been begun and which will be followed with scrupulous care is the development of early maturing strains of the grains under cultivation by a process of selection. To this end the crops are carefully watched, and the earliest maturing heads are cut and then labeled with the date of maturity and their characteristics studied. The seed from these early heads will be planted on specially prepared seed beds, and the individual plants watched with a view to noting their desirable qualities. The earliest maturing heads will, in like manner, be selected from these, and those among them which possess other valued qualities will be preserved for propagation in the same manner. By these means it is hoped that varieties which will make rapid growth and mature before crops raised from seed grown farther south may eventually be secured. This work will be carried on more particularly at the Rampart and Copper Center stations.

It will be noted from Mr. Rader's report that the hardy vegetables were a success. Special attention is called to a fact which he states very briefly, namely, that potatoes which were sprouted in a warm place and planted with special care so as not to break the sprouts "came up soonest, grew the largest and the most mature potatoes, and produced nearly twice as much as those planted in the ordinary way."

In the interior, where potatoes are worth from 10 to 15 cents per pound, it is well worth giving extra care to the crop. Potatoes have been grown and wintered successfully both at the Copper Center and Rampart stations.

KENAI STATION.

Work at the Kenai Station has been devoted wholly to growing feed for live stock, to testing some of the grasses and forage plants, and to dairy work. There are 26 acres under cultivation at this station, all of which has been reclaimed from the forest. Grains have not matured satisfactorily in this region in former years, and therefore any attempt to grow grain has been given up except for hay. Nearly the whole area was seeded to oats, which was cut for hay in the latter part of August and the early part of September.

Aside from this, the superintendent, Mr. P. H. Ross, has devoted his time to the manufacture of butter and cheese on a small scale. The object is to ascertain if dairying can be made a success in that region when cattle are fed wholly on feed grown there. With this end in view, the station was provided with a modest equipment of dairy apparatus. The chief piece of machinery is a small hand separator. A small barrel churn with a capacity of 15 gallons has

proven satisfactory. A hand butter worker, a Babcock 12-bottle milk tester, and a small cheese vat and press with the necessary accessories complete the outfit. The whole equipment cost $150 at point of shipment. It was selected with the idea that it would meet the demands of a small farm dairy, such as might be established in Alaska in many places, and the results have proven that it answers these requirements. The outfit is sufficient to handle the milk from about 12 or 15 cows. If much cheese is to be made, however, a larger cheese-making apparatus should be chosen. The one purchased for the station is too small for commercial purposes.

The cows in milk averaged only three head most of the time, and they are not first-class dairy cows. Their milk was, however, made into butter and cheese enough to supply local demand for these articles. The butter has been especially good. It was made into 1-pound prints, and these were wrapped in paraffin paper. That which was not sold promptly was preserved in brine. For a short period it will keep very well that way, but if kept more than two months it begins to deteriorate. When the writer visited the station in the latter part of July he made up a package of butter and cheese, which was forwarded to Washington. Although on arrival at the Department, during an exceedingly hot spell, the butter was almost oily, the natural consistency was restored by placing it for a few days in cold storage. Both the butter and cheese were pronounced very good.

During the open season the cattle run at large and live exclusively on the native grasses, which are sweet and nutritious. The cattle are maintained in excellent condition, and this experiment would indicate that this native food is also well adapted for dairying.

There are extensive areas of wood pasture throughout the Kenai Peninsula which can be utilized by dairy farmers should they choose to locate there. There are no extensive meadows, except in some stretches of lowland along the coast of Cook Inlet, and the swamp grass in these regions does not make the best feed. The higher land is very largely wooded with spruce, birch, alder, and bushes of many kinds. These woods are open in many places, and in other places there are little patches of meadow where but few or no trees grow, and it is these open woods that afford the pastures. There are but small areas that can be mowed; here and there are patches of from 5 to 40 acres which can be mowed for hay, but as a rule land will have to be cleared and leveled before a mower can be run over it.

There is one important feature which should be mentioned in this connection, and that is that there is at present no local market of any consequence in the peninsula. Dairy products would have to be shipped to towns and settlements along the coast, where they would

come in competition with dairy produce shipped up from Puget Sound, and owing to the fact that the coastwise traffic is irregular and inadequate the freight charges on small local shipments would probably be as great or greater than freight charges on larger shipments from Puget Sound to the same points. When railroads are built so that the mining camps in the interior can be reached prospective dairy farmers in the Kenai Peninsula and elsewhere in the coast region will have better markets for their products than are at present available.

Mr. Ross's report, which is submitted herewith, details at some length the growth of the grasses which he has under experiment, and also touches on the efforts at gardening which were made at the station the past season.

ADDITIONS TO BUILDINGS.

Some inexpensive additions were made to the station buildings in August last. A wood shed, 8 by 14 feet, was added to the log house which serves as the superintendent's dwelling. This was made necessary because the shed which was there was converted into a dairy room. A blacksmith shop, 14 by 20 feet, was built, and an implement shed, 14 by 20 feet, was erected against the side of the barn for the shelter of the implements. Both of these were put up so that the tools and implements could be moved from the barn floor and the space thus gained utilized for the storage of hay. The framework of these additions was made of poles cut in the woods, and the roof and siding were made of damaged tin obtained from the ruins of the Kusilof cannery, which was burned.

INTRODUCTION OF GALLOWAY CATTLE.

The appropriations for the fiscal years 1906 and 1907 each carried $3,000 to be expended in experiments with live stock in Alaska. For these experiments it was deemed best to select a hardy breed of cattle which should be well adapted to the climatic conditions of that far northern region. The Galloway breed was selected for that purpose. West Highland cattle are undoubtedly equally hardy, but there are so few of them in America that the prices for fine individuals run very high; moreover, they are rather wild by nature and have long, heavy horns, facts which would handicap experiment stations in handling them. Galloways have no horns. They have a thick coat of hair, and docile, tractable animals can readily be obtained. So, all things considered, the Galloway was deemed the best breed for the purpose. Eleven head—two bulls and nine females—were purchased and sent to Alaska. One of the bulls was imported from Scotland as a yearling. These cattle were bought from

FIG. 1.—IMPORTED SIR HENRY OF LOCHSIDE, KENAI STATION.

FIG. 2.—LEWANDA AND CALF, ALASKA MAID, KENAI STATION.

F. J. Wild, of Cowgill, Mo., and William Brown & Son, of Carrollton, Mo. They arrived at their destination in perfect condition, without the slightest mishap. The fact that they were accustomed to being handled and were therefore very gentle was doubtless an important point in their being transported so successfully. Seven of them—one bull, five cows, and a calf—were sent to Kenai Station (Pl. III, figs. 1 and 2) and the remainder to Wood Island, where they have been temporarily cared for by Mr. C. P. Coe, who has charge of the Kodiak Baptist Orphanage. They arrived at their new homes in May and were at once turned loose to hustle for their living on the native pastures. They took kindly to their new surroundings from the beginning, and have taken on flesh rapidly after their long journey of nearly two months. The writer visited the Kenai Station in July, but owing to the long time it would take to wait for boats he did not go to Wood Island.

Mr. Coe reports that the cattle have maintained themselves well and gained in weight from the day they arrived, those sent him being 2-year-olds. At the Kenai Station the writer found the cattle in a thriving condition; they had fleshed up well, maintained their docile character, and behaved in all respects as they had on the stock farms where they were bred. They keep by themselves, aloof from other cattle, probably because of fear of the horns of the other cattle. All cows were in calf when purchased, and all have since dropped healthy calves.

PROPOSED EXPERIMENTS WITH LIVE STOCK.

It is planned to take up several lines of work which may be of benefit to prospective stock breeders in Alaska. First, it is desirable to demonstrate to what extent it may be practicable to keep cattle. Cattle have, indeed, been kept in the coast region at various places for many years. The Russians kept cattle at some of their trading stations long before the American Government acquired the Territory, but they confined their cattle raising to some of the most favorable situations. They made no attempt to keep cattle in the interior. One of the objects in view is to see if it is practicable to keep cattle in the interior, where they must be housed and fed for eight months of the year. This will not be attempted, however, until the herd shall have increased sufficiently, by purchase and breeding, so that selections can be made from it without drawing too heavily on the number kept for breeding; nor are the interior stations yet equipped to handle cattle to advantage.

Another object which the station has in view is to introduce and as far as possible stock the Territory with a hardy breed, one better suited to stand the harsh climate than are the common cattle of the

Pacific coast region, which contain a large percentage of Jersey blood. It is hoped that in a very few years the station may have Galloway cattle for sale for breeding purposes at a reasonable price, so as to enable settlers in Alaska to obtain acclimated stock.

Still another object in view is to develop an all-purpose breed from the Galloway. This will require some time. The Galloway has been bred chiefly for beef. It is a low, blocky animal of the beef type. Some of the breed are fairly good milkers, but as a rule they have not been used for dairy purposes. Settlers in Alaska will need a cow which will be a fairly good milker as well as a good beef producer, and it is planned to develop the dairy quality to a certain degree by selection and breeding without destroying the other characteristics which make the breed desirable for Alaska, namely, its heavy coat of hair, its hardy nature, and its ability to rustle. There are comparatively few cattle in Alaska now. Those which are kept in the towns are fed chiefly on imported feed and are kept for the purpose of supplying the local market with milk; but few homesteaders keep cattle of any kind. It is hoped, by rendering Galloway bulls available, a race of grades may be developed which may in large measure have the hardiness of the Galloways.

Nor are the live-stock experiments to be limited to cattle. It is planned to import at least one hardy breed of sheep as soon as money is available for that purpose and provision made for their care. The breed should be selected with a view to hardiness. The Blackfaced Scotch would answer the purpose well, and perhaps it might be possible to import a small flock from Iceland. What is required is a sheep with pronounced hustling qualities which can withstand a severe climate and is as nearly exempt from disease as possible.

A LIVE-STOCK BREEDING STATION.

It is planned to establish a live-stock breeding station at some point which can be reached without difficulty and where feed is abundant and the stock can run out nearly the year round, so that little winter feeding will be required. Kodiak Island, perhaps, more nearly answers these requirements than any other point in Alaska, and it is therefore hoped that it may be possible to start a breeding station at some suitable point on that island. Some buildings are necessary. In addition to barns and sheds there should be a cottage or two for the superintendent and his assistant, and a dairy building for the further prosecution of that branch of the industry. The cattle, which are to be purchased the coming spring, should be located there, and so should the cattle which are now at Wood Island and the Kenai Station, so as to concentrate the work in that line in one place for the sake of economy and efficiency.

NOTES ON NURSERY STOCK, SITKA STATION.

APPLES.

DWARF TREES IN BREWERY LOT.

Sweet Bough: June 1, three trees in good condition. July 1, 6 inches new growth. August 1, somewhat affected by leaf fungus; sprayed with Bordeaux mixture. September 1, 18 inches new growth. October 1, average growth 18 inches; one tree 2 feet. New growth very tender.

Tetofsky: June 1, three trees doing well. July 1, 5 inches growth. August 1, sprayed for leaf fungus. September 1, very thrifty; 15 inches growth. October 12, average growth 18 inches.

Golden Sweet: June 1, three trees in excellent condition. July 2, thrifty, 1 foot growth. September 1, 2 feet growth. October 12, average growth 27 inches; tips very tender.

Primate: June 1, two trees in good condition. July 2, 6 inches growth. September 1, 2 feet growth. October 12, average growth 27 inches; tips very tender.

Early Harvest: June 1, in good condition. July 2, growth short; thrifty appearance. September 1, 18 inches growth. October 12, average growth 2 feet; new growth very tender.

Fanny: June 1, three trees in fine condition. July 2, unthrifty. September 1, 15 inches growth. October 12, average growth 18 inches.

Keswicks Codlin: June 1, three trees in good condition. July 2, growth short; thrifty looking. September 1, 15 inches growth. October 12, 2 feet growth; very tender.

Yellow Transparent: June 1, three trees in fine condition. July 2, 4 inches growth. September 1, 2 feet growth. October 12, 27 inches growth; tips of new growth very tender.

Red Astrachan: June 1, three trees in good condition. July 2, growth short. September 1, 14 inches growth. October 12, 18 inches growth.

STANDARD TREES.

Fanny: June 1, five trees in fair condition. July 2, not doing well. September 1, 12 inches growth; appears unthrifty. October 12, average growth 15 inches.

Golden Sweet: June 1, five trees in good condition. July 2, 4 inches new growth. September 1, 15 inches growth. October 12, 2 feet growth; very tender.

Sops of Wine: June 1, five trees not in good condition. July 2, not doing well. September 1, 12 inches growth; unthrifty. October 12, 15 inches growth; unthrifty.

Summer Rose: June 1, five trees in poor condition. July 2, no new growth. September 1, unthrifty; 8 inches growth. October 12, unthrifty.

Sweet Bough: June 1, five trees in good condition. July 2, 6 inches new growth. September 1, 15 inches growth; thrifty. October 12, strong; 2 feet growth.

Early Strawberry: June 1, five trees in good condition. July 2, thrifty; 6 inches growth. September 1, 12 inches new growth; rather unthrifty. October 12, unthrifty; 15 inches growth.

Primate: June 1, five trees in good condition. July 2, 5 inches growth. September 1, 18 inches growth. October 12, 2 feet growth; thrifty; tips very tender.

Williams Favorite: June 1, three trees in fine condition. July 2, 6 inches growth. September 1, 15 inches strong growth. October 12, 18 inches growth.

Benoni: June 1, five trees in good condition. July 2, 6 inches growth. September 1, two trees doing well; 15 inches growth. October 12, two trees average growth 2 feet; others 14 inches.

NOTE.—These trees were sprayed three times with Bordeaux mixture for leaf fungus. The new wood is very soft, too tender to withstand freezing. The leaves were stripped off October 10 to check the growth, that the new growth might harden. All are young trees, and none of them have showu blossoms or fruit.

APPLES ON STATION GROUNDS.

Duchess: May 1, fourteen trees; poor condition; buds swelling. May 15, nearly full leaf. June 1, give little promise. July 1, very little growth. September 1, making no growth. October 1, very poor conditiou.

Martha: May 1, seventeen trees; buds swelling. May 15, buds opening. June 1, very backward. Juue 15, eight trees give promise; very little growth. September 1, eight trees growing some. October 12, in poor condition.

Hibernal (block 1): May 1, seven trees; good coudition. June 1, starting nicely. July 1, very thrifty appearance. July 15, 4 inches growth. September 1, 12 inches growth. October 12, good condition.

Whitney: May 1, seventeen trees; good condition; buds opening. May 15, nearly full leaf. June 15, 3 iuches growth. September 1, average new growth 18 inches. October 12, good coudition.

Red Astrachau: May 1, fifteen trees; good condition. May 15, full leaf. June 1, 2 inches growth. September 1, all trees unthrifty. October 12, little growth; poor condition.

Lowell: May 1, fair condition. May 15, very backward. June 1, growing slowly. July 1, not doiug well. July 15, gives promises. September 1, doing well; 10 inches growth. October 12, good condition.

Tetofsky: May 1, twenty trees; fair condition. May 15, nearly full leaf. June 1, good color; no growth. July 2, rather backward. September 1, appearing thrifty, but have made no growth. October 12, same condition.

Yellow Transparent: May 1, eighteen trees; good condition. May 15, full leaf. June 1, very little growth. July 15, 3 inches growth. September 1, average new growth 15 inches; thrifty. October 12, good condition.

Eureka: May 1, fourteen trees; good condition. May 15, nearly full leaf. June 1, rather backward. July 1, gives some promise. September 1, all look well; average growth 14 inches. October 12, fair condition.

Sylvan Sweet: May 1, sixteen trees; good condition. May 15, in full leaf. July 15, thrifty; short growth. September 1, average new growth 12 inches. October 12, good condition.

Byers Sweet: May 1, eight trees; poor conditiou; buds swelling. May 15, nearly full leaf. June 1, backward. July 1, uuthrifty. September 1, no growth. October 12, poor condition.

Raspberry: May 1, eighteen trees; good condition. May 15, full leaf. July 15, 3 inches growth. September 1, 15 inches growth. October 12, good coudition.

Red June: May 1, fifteen trees; fair condition. Juue 1, rather backward. July 15, 2 iuches growth. September 1, 12 inches growth. October 12, good conditiou.

Maiden Blush: May 1, five trees; fair condition. July 1, rather backward. July 15, two trees growing. September 1, two trees each made 12 inches growth. October 12, but two trees in good condition.

Early Harvest: May 1, sixteen trees; seven in good condition. June 1, unthrifty. July 1, very little growth. September 1, seven have made average growth of 12 inches. October 12, seven in good condition.

Patten: May 1, seven trees; good condition; buds swelling. June 1, very thrifty. July 15, 3 inches growth. October 12, in fine condition, except that the new growth is tender.

Jessie: May 1, seven trees; fair condition; buds opening. June 1, very backward. July 1, promises but little. September 1, very little growth. October 12, poor condition.

Hibernal (block 2): May 1, seven trees; good condition; buds opening. July 1, thrifty. July 15, 2 inches growth. September 1, 12 inches growth. October 12, poor condition.

Peerless: May 1, seven trees; good condition; buds opening; June 1, doing nicely. July 15, 3 inches growth. September 1, 15 inches growth. October 12, very good condition.

Yellow Transparent: May 1, two trees; fine condition; buds well advanced. July 1, making vigorous growth. July 1, one tree in bloom; no fruit set. September 1, 2 feet growth. October 12, in good condition.

Duchess (block 2): May 1, eight trees; fair condition; buds swelling. July 1, look thrifty; growth short. September 1, very little new growth. October 12, trees in fair condition.

Red June: May 1, four trees; fair condition; buds swelling. June 1, very thrifty. July 15, 3 inches growth. September 1, 15 inches growth. October 12, good condition.

Hyslop: May 1, five trees; good condition; buds well advanced. July 15, very thrifty; 4 inches growth. September 1, 2 feet growth. October 12, new wood very tender, otherwise good condition.

Transcendent: May 1, two trees; good condition; buds well advanced. May 15, full leaf. July 1, very thrifty. July 15, 6 inches growth. September 1, 12 inches growth. October 12, good condition.

Note.—These trees were sprayed once in June, twice in July, and once in August with Bordeaux mixture for leaf fungus. The leaves were stripped off October 10, in order to check the new growth and harden the new wood. Last winter, that of 1905–6, was a severe one; the temperature fell to 2 below zero, which is the lowest it has been for about sixty years. The mild moist weather the preceding fall caused growth to be prolonged unduly, and the tender wood was killed back in most cases from 4 to 6 inches. The same will be the case whenever the temperature approaches zero. To assist in maturing the wood, the leaves were stripped from these trees early in October.

APPLE TREES GRAFTED AT THE STATION, 1904.

Lowell, whip graft on native crab-apple stock: May 1, two trees; good condition; buds opening. May 15, in full leaf. July 1, very thrifty. July 15, 4 inches growth. September 1, 12 inches growth.

Lowell, crown graft on native crab apple: May 1, four trees; good condition; buds opening. July 15, 4 inches growth. September 1, average growth 9 inches.

Duchess, topworked on native crab apple: May 1, one tree; good condition; buds opening. May 15, full leaf. July 1, 6 inches growth. September 1, 18 inches growth. October 12, good condition.

Duchess, whip graft on native crab-apple stock: May 1, fair condition; buds opening. July 1, not doing well. September 1, 1 foot spindling growth. October 12, not in good condition.

Okabena, topworked on native crab-apple stock: May 1, one tree; good condition; buds opening. July 1, very thrifty. July 15, 4 inches growth. September 1, 15 inches growth. October 12, in good condition.

Okabena, whip graft on native crab-apple stock; May 1, fair condition. July 15, 3 inches growth. September 1, 9 inches growth. October 12, good condition.

Minnesota, whip graft on native stock: May 1, fair condition. July 15, 4 inches growth. September 1, 9 inches spindling growth.

Jewett, whip graft on native stock: May 1, fair condition. July 15, spindling; 3 inches growth. September 1, 6 inches growth. October 12, poor condition.

Whitney, whip graft on native stock: May 1, fair condition. July 15, spindling; 3 inches growth. September 1, 6 inches growth. October 12, poor condition.

Walbridge, whip graft on native stock: May 1, in fair condition. July 15, spindling; 4 inches growth. September 1, 6 inches growth. October 12, poor condition.

North Star, whip graft on native stock; May 1, poor condition. July 15, 5 inches growth. September 1, 8 inches growth. October 12, poor condition.

NEW GRAFTS, 1906.

Seven hundred trees of five varieties: June 1, made good start; ravens destroyed a few. August 1, 98 per cent doing nicely. September 1, made good growth. October 12, heeled in for distribution in the spring.

Apple seedlings: May 21, set in nursery row. July 2, all growing slowly. September 1, short but thrifty growth. October 10, three thousand heeled in for stock on which to graft.

Pyrus baccata: May 1, fourteen trees; good condition; buds opening. July 15, growing nicely. September 1, average growth 12 inches.

Juneberry: May 1, good thrifty condition. July 1, growing nicely; in bloom. July 15, 6 inches growth; well set with fruit; yet blooming. August 15, fruit ripening; rather small. September 1, fruit ripe; new growth average 18 inches. October 12, splendid condition.

YEARLING APPLES SET IN NURSERY ROWS MAY 14.

Greenwood Crab: May 21, one hundred trees; good condition. July 1, doing nicely. September 1, 18 inches growth. October 10, heeled in for distribution in spring of 1907.

Yellow Siberian Crab: May 1, one hundred trees in good condition. July 1, doing nicely. September 1, 2 feet growth. October 12, heeled in for distribution.

TWO-YEAR-OLD APPLE TREES SET IN NURSERY ROWS.

Early Strawberry: Three hundred and fifty trees set. September 1, all trees growing; average growth 15 inches. October 11, heeled in for distribution.

Whitney: May 18, three hundred and fifty trees set. September 1, all growing; average growth 15 inches. October 11, heeled in.

Beecher Sweet: May 18, thirty-six trees set. September 1, not doing as well as other varieties; average new growth 8 inches.

Dart: May 18, fifty trees set. September 1, very thrifty; 18 inches growth. October 11, heeled in.

Orange: May 18, two hundred and ninety trees set. September 1, few trees died; others doing nicely. October 11, heeled in.

Transcendent: May 18, set in nursery rows. September 1, all trees lived, making an average growth of 18 inches. Left in nursery row.

FIG. 1.—APPLE GRAFTED ON NATIVE CRAB APPLE IN SITKA NURSERY.

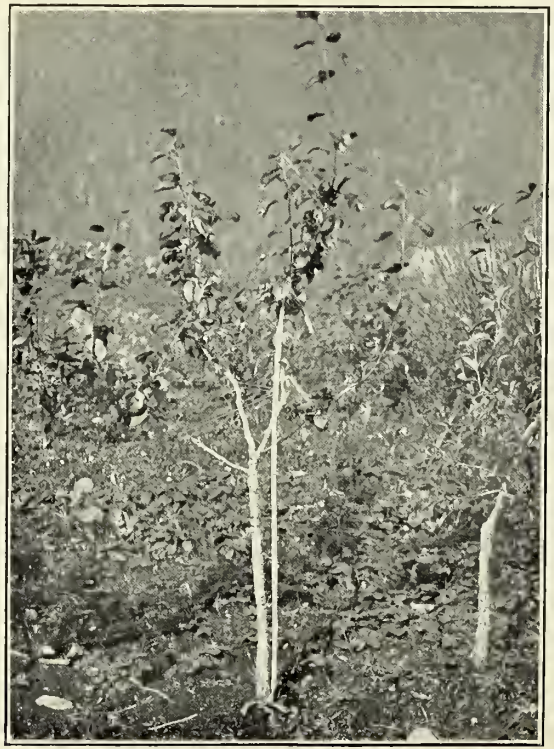


FIG. 2.—THREE-YEAR-OLD CHERRY TREE IN SITKA NURSERY.

CHERRIES.

English Morello: May 1, eight trees; good condition. May 15, buds nearly open. July 1, in bloom. July 15, petals falling; about 20 per cent of bloom set fruit. August 10, fruit ripe; many cherries deformed (Pl. IV, fig. 2). September 1, 2 feet growth. October 12, tips of new wood very tender.

Ostheim: May 1, fourteen trees; good condition. June 1, thrifty. July 1, in full bloom. July 15, 6 inches growth; fruit well set. August 5, fruit ripe; fair condition. September 1, average new growth 15 inches. October 12, new wood not so tender as English Morello.

Early Richmond: May 1, nineteen trees; good condition. June 1, very thrifty. July 1, in full bloom. July 15, about 40 per cent of bloom fertilized. August 1, fruit ripe; some cherries deformed. September 1, new growth 2½ feet. October 15, very tender.

Dyehouse: May 1, nineteen trees; good condition. June 1, growing nicely. July 1, full bloom. July 15, 4 inches growth; fruit well set. July 23, fruit well ripening. August 5, fruit ripe; some deformed. September 1, 2½ feet growth. October 12, new wood very tender.

Sand cherry: May 1, six bushes; good condition. June 1, rather backward in starting growth. July 15, thrifty; in bloom. August 1, no fruit set. September 1, look thrifty; 10 inches growth. October 12, good condition.

PLUMS.

May Day: May 1, three trees; tips winterkilled. May 15, buds opening. July 1, two trees very thrifty; others not doing well. August 1, 10 inches growth. September 1, new growth, 15 inches. October 12, new wood very tender.

Tomahawk: May 1, one tree; fair condition. June 1, not making growth; looks thrifty. September 1, new growth, 3 inches. October 12, good condition.

Sayles: May 1, two trees; fair condition; tips winterkilled. June 1, not doing well. August 1, growing nicely. September 1, 18 inches growth. October 12, new wood very tender.

Wyant: May 1, two trees; fair condition; tips winterkilled. June 1, very backward. July 1, growing nicely. September 1, 18 inches growth. October 12, new wood very tender.

Hawkeye: May 1, two trees; fair condition; tips killed by frost. June 1, not doing well. July 1, making good growth. September 1, 18 inches new growth. October 12, new growth very tender.

Forest Garden: May 1, two trees; poor condition. June 1, very backward. July 1, making some growth. September 1, 15 inches growth.

De Sota: May 1, poor condition; four trees; badly injured by frost. June 1, very backward. August 1, making some growth. September 1, new growth very short. October 12, fair condition.

Rollingstone: May 1, one tree; fair condition. June 1, rather slow in making growth. July 1, making some growth; looks thrifty. September 1, 12 inches growth. October 12, good condition.

Sioux: May 1, one tree; fair condition. June 1, growing nicely. July 15, in bloom. August 1, no fruit set. September 1, 8 inches growth. October 12, good condition.

Red June: May 1, one tree; bad condition. June 1, very unthrifty. August 1, very poor. September 1, bad condition.

Aitkin: May 1, eleven trees; fair condition. June 1, very backward. August 1, three thrifty trees. September 1, seven trees alive; three thrifty, making 15 inches new growth.

Prunus besseyi: May 1, fifty trees; fair condition; tips winterkilled. June 1, making some growth; look thrifty. September 1, 8 inches growth. October 12, good condition.

Odegaard: May 1, six trees; fair condition. June 1, doing nicely. August 1, thrifty growth. September 1, 2 feet growth. October 12, new wood very tender.

Seedling Americana: May 1, one hundred trees; fair condition. July 1, making thrifty growth. August 1, few leaves affected by fungus. September 1, 2 feet growth. October 12, new wood rather tender.

Seedling of Cherry plum: May 1, eighty trees; most all in good condition. June 1, doing nicely. July 1, thrifty; 4 inches growth. September 1, 2½ feet growth. October 12, new wood very tender.

Seedling of Wyant: May 1, twenty trees; good condition. June 1, doing nicely. August 1, making vigorous growth. September 1, 2 feet growth. October 12, good condition.

BUSH FRUITS.

High-bush cranberry: May 1, in fair condition. June 1, very backward. August 1, looks thrifty; very little growth. September 1, 6 inches growth; good condition.

Buffalo berry: May 1, in fair condition. June 1, very backward. August 1, making but little growth. September 1, very poor condition.

Sand cherry (Western): May 1, good condition. June 1, in full leaf. August 1, thrifty growth. September 1, 8 inches growth. October 12, good condition.

CURRANTS.

Native currant from Sunrise: June 1, bad condition. August 1, making no growth. September 1, nearly dead.

Red Cross: June 1, in leaf; thrifty. July 1, in bloom. July 15, fruit well set. July 23, fruit ripening. August 10, fruit picked; berries large; excellent quality. September 1, 2 feet new growth.

Black Champion: June 1, well advanced. June 15, in bloom. July 1, some fruit set. August 18, fruit picked; fruit large; excellent quality.

Lee Prolific: May 15, in leaf. June 15, in bloom. August 20, fruit picked; berries medium; clusters small; excellent quality. September 1, new canes 2 feet long.

Wilder: May 15, in leaf. June 15, in bloom. July 1, very little fruit set. August 15, fruit eaten by robins. September 1, 3 feet new growth.

Russian Black: May 15, vigorous. June 1, in bloom. June 15, very little fruit set. August 20, fruit picked; berries small; quality poor. September 1, 3 feet canes.

Ruby Castle: June 1, plants look thrifty; makes no growth. September 1, 18 inches growth; not vigorous.

Common Red: June 1, very backward; in bloom. June 15, very little fruit set. August 15, fruit taken by robins. September 1, poor condition.

Black currants: June 1, good condition. June 15, in bloom. July 15, no fruit set. September 1, 3 feet new growth; very tender.

Native currant: June 1, well advanced. July 15, not looking vigorous. September 1, 18 inches new growth.

Amber-Colored: June 1, good condition. June 15, making good growth; does not appear vigorous. September 1, 3 feet new growth.

Victoria: June 1, well advanced; in bloom. June 15, fruit well set. August 20, fruit picked; berries medium size; clusters loose; quality excellent. September 1, 18 inches growth.

Craudall: June 1, well advanced. September 1, 2 feet new growth.

Fay Prolific: June 1, poor condition. August 1, making growth; not vigorous. September 1, very little growth; poor couditiou.

White curraut: June I, growing nicely; in bloom. June 15, fruit poorly set. August 20, fruit picked; berries small; good quality. September 1, 18 inches new growth.

Currant cuttings of various varieties, 2,000 plants: September 1, top growth very short; root system well developed.

RASPBERRIES.

Turner: June 1, caues badly injured by freezing. July 1, in bloom. August 10, fruit ripe; berries small. September 1, new canes 3 feet long; fruit yet ripening.

Fuller Colorado: June 1, tips of capes winterkilled. June 15, blooming August 10, first ripe fruit. September 1, new growth 4 feet.

Miller Favorite: June 1, canes badly winterkilled. June 15, first bloom. August 10, first ripe fruit. Septeuber 1, new growth 3½ feet.

London: June 1, tips of caues winterkilled. June 15, first bloom. August 10, first ripe fruit; new growth 3½ feet.

Champlain: Three bushes transplauted May 18. July 1, making some growth; few bloom. September 1, new canes 3 feet long.

Orange: Transplanted May 18. July 1, growing. September 1, 3 feet new growth.

Superlative: Transplauted May 18. June 1, fair condition. July 1, seems thrifty. September 1, new growth 3 feet.

GOOSEBERRIES.

Champion: June 1, thirteen plants; good condition; in blooiu. June 15, fruit well set. September 1, fruit overripe; picked for seed; 2 feet new growth.

English: June 1, six plants; growing nicely; in bloom. June 15, fruit well set. August 15, fruit ripe; berries large; excellent quality. September 1, 2 feet new growth.

Triumph: June 1, fair condition; in bloom. June 15, very backward; few berries set. September 1, 15 inches new growth.

Red Jacket: June 1, six plants; doing well; in bloom. June 15, few berries. September 1, fruit ripe; good quality; 2 feet growth.

Smith Imperial: June 1, growing nicely; in bloom. June 15, fruit well set. August 15, fruit ripe; good quality; berries large. September 1, new growth 6 inches.

Whitesmith: June 1, nine plants; thrifty; in bloom. June 15, few berries. August 25, fruit ripe. Septeuber 1, 2½ feet growth.

Columbus: June 1, eight plants; fair condition. July 1, rather backward. September 1, very little growth.

Industry: June 1, eight plants; fair condition; in bloom. June 15, rather backward; some fruit set. September 1, little growth; fruit ripe.

Thimble berry (native): June 1, growing nicely; in bloom. June 15, fruit well set. August 20, fruit ripe. September 1, new caues 2 feet loug.

STRAWBERRIES.

Hollis: May 1, plants injured by frost heaving the ground; promises fairly well. June 15, full bloom; pistillate flower; fruit setting well. July 2, plants

yet blooming; nearly every bloom sets a fruit. July 5, fruit ripening. August 15, last picking. September 1, plants vigorous.

Yakutat (native Alaskan): May 1, plants somewhat injured by heaving of ground. June 15, past full bloom; about half staminate; setting fruit rather sparingly. July 2, fruit ripening. August 1, last picking. September 1, plants vigorous.

Bismark: May 15, plants transplanted. July 1, growing nicely. September 1, many new plants; vigorous.

Enhance: May 15, plants transplanted. July 1, growing nicely. September 1, vigorous new plants.

Magoon: Only a few plants. July 9, a few berries ripe; fine large symmetrical fruit; forms new plants freely.

ORNAMENTALS.

Eglantine: May 1, nine plants; winterkilled to the ground. May 15, new growth starting. June 1, growing nicely. September 1, 3 feet new growth.

Rosa rugosa: May 1, uninjured by freezing; buds swelling. June 15, vigorous new growth; bloom buds nearly open. July 15, layered branches to root new plants. September 1, layered branches rooted poorly; seedlings growing nicely.

Lilac (common): May 15, very backward in starting. June 1, appears thrifty; makes no growth. September 1, 6 inches new growth.

Ural willow: May 1, uninjured by frost; good condition. June 15, growing nicely; blooming. August 1, no seed set. September 1, 3 feet new growth; cuttings did well.

Niobe willow: May 1, tips killed by frost. June 15, growing nicely. September 1, 2 feet new growth.

Mountain ash: May 1, uninjured by frost; in fine condition. June 15, growing nicely. September 1, 15 inches new growth.

Siberian sandthorn: May 1, rather backward in starting. June 15, making some growth. September 1, looks thrifty; 2 inches growth.

Speer elderberry: May 15, very poor condition; badly winterkilled. July 1, two plants growing, but very weak. September 1, in bad condition.

Caragana arborescens: May 15, very backward. June 15, making some growth. September 1, very short growth; looks thrifty.

Caragana microphylla: May 15, very poor condition. June 15, nearly dead. September 1, bad condition.

Lonicera alba rosea: May 1, four plants uninjured by frost; starting nicely. June 1, 15 inches growth; in bloom. September 1, 2 feet growth.

Lonicera tatarica rosea: May 1, hardy; buds swelling. June 15, 1 foot growth. September 1, 30 inches growth.

Lonicera tatarica splendens: May 1, hardy. June 1, growing, but not so vigorous as other varieties. September 1, 1 foot growth.

Lonicera tatarica grandiflora: May 1, hardy; buds swelling. June 15, 1 foot growth. September 1, 15 inches growth.

Lonicera albida: May 1, hardy; growth starting. June 15, 12 inches growth. September 15, 15 inches growth.

VEGETABLES.

The principal investigations with vegetables at the Sitka Station were in testing varieties of potatoes, cabbage, cauliflower, kale, Brussels sprouts, beans, and peas in order that definite suggestions would be possible regarding those varieties adapted to Alaska conditions.

POTATOES.

The following varieties of potatoes were grown at the Sitka Station the past season. Of some of them we had only small quantities of seed; of others, as, for instance, the Freeman, which has been grown here for three years past, we had more seed and grew them in larger quantities.

It is becoming apparent that potatoes depreciate both in size and quality when they are grown here for a few years in succession.

All our potatoes were planted late on account of the cold, wet spring. They were practically all up June 15. The yield per acre is not given for varieties grown on a very small scale.

Extra Early Ohio: A white potato; oblong and slightly flattened; medium size; shallow eyes; skin thin; early; yield at the rate of 280 bushels per acre; 60 per cent first grade, 30 per cent second grade; 10 per cent third grade; quality, first class.

Extra Early Triumph: A white, oblong potato, which resembles the Extra Early Ohio closely. It has, however, shallower, broader eyes than the Extra Early Ohio and averages a little smaller in size; early; quality, first class.

Norwegian No. 1: Imported from Norway in 1904; size medium; irregularly rounded; skin yellow, slightly roughed; eyes very small and deep; early; quality, first class.

Norwegian No. 2: Imported from Norway in 1904; size medium; irregularly rounded; skin white, smooth, and thin; eyes deep and small; resembles Norwegian No. 1 very closely, except that it is a trifle larger and has a whiter skin; quality, first class.

Norwegian No. 3: Imported from Norway in 1904; size medium to small; irregularly rounded; skin red and thick; eyes deep and broad; early; quality, second class.

Freeman: Medium to large; oblong, usually broader at one end, slightly flattened; skin white and thin; eyes shallow; medium early; yield 379 bushels per acre; 54 per cent first grade, 24 per cent second grade, and 22 per cent third grade; quality, dry and mealy. It resembles the Extra Early Ohio closely and is an excellent potato; quality, first class.

Early Ohio: Medium to small; rounded; skin red and slightly russeted; eyes rather deep and narrow; medium early; quality first class.

Bovee: Medium size; oblong, occasionally flattened; skin pink, slightly mottled; eyes small and rather deep; medium early; 74 per cent first grade, 26 per cent second grade; quality first class.

Lincoln: Medium to small; rounded, occasionally oblong; skin pink, mottled, slightly russeted with white specks; eyes medium shallow and broad; medium early; 74 per cent first grade, 26 per cent second grade; quality second class.

Carman No. 3: Medium to small; oblong, flattened, and somewhat irregular; skin white with brown specks; eyes shallow; late; 59 per cent first grade, 28 per cent second grade, 13 per cent third grade; quality first class.

Early Market: Small to medium; rounded; skin light pink, mottled, thick, somewhat russeted; eyes medium deep; early; 65 per cent first grade, 23 per cent second grade, 12 per cent third grade; quality first class.

Irish Cobbler: Medium; rounded and irregular; skin yellow; eyes medium deep; early.

Gold Coin: Large; oblong to rounded, slightly flattened; skin yellow, thick, with numerous small brown specks; eyes shallow and broad; late; yield per acre, 271 bushels; 56 per cent first grade, 33 per cent second grade, 11 per cent third grade; this is considered one of the best potatoes for Alaska; quality first class.

Eureka: Medium to small; rounded; skin yellow and thick; eyes rather large; medium early.

Hamilton Early: Medium; oblong, occasionally rounded; skin white; eyes very broad and shallow; early; yield per acre, 160 bushels; 38 per cent first grade, 34 per cent second grade, 28 per cent third grade.

Burpee Early: Medium; long, slightly flattened; skin light pink, slightly mottled and russeted; eyes shallow and broad; early; quality second class.

Ohio Junior: Medium; rounded, somewhat irregular; skin pink or slightly mottled, thick, and russeted; eyes medium deep and rather large; early; 66 per cent first grade, 34 per cent third grade; quality, third class.

Bauuer: Large; oval, slightly flattened; skin yellow and thick; eyes shallow and rather broad; early; yield per acre, 217 bushels; 67 per cent first grade, 28 per cent second grade, 5 per cent third grade; quality, second class.

White Beauty: Medium; oval to oblong, slightly flatteued; skin yellow; eyes few and very shallow; early; quality, third class.

White Mammoth: Large; oval, flattened, uuiform size; skiu yellow and smooth; eyes very shallow and broad; early; yield per acre, 174 bushels, all first grade; quality, first class.

Early Harvest: Medium; oblong to rounded; skiu yellow, slightly russeted; eyes medium deep; early; yield per acre, 295 bushels; 52 per ceut first grade, 25 per cent second grade, 23 per cent third grade; quality, second class.

Vigorosa: Medium to large; oval to oblong; skin mottled, pink; eyes mediuu shallow; early; yield per acre, 248 bushels; 64 per ceut first grade, 18 per cent second grade; quality, first class.

Voruehm: Medium; oval to rounded, slightly flattened, irregular in shape; skin white, slightly russeted; eyes few, small, shallow, and inconspicuous; early; yield per acre, 156 bushels; 47 per cent first grade, 31 per cent second grade, 22 per cent third grade; quality, most excellent.

Early Michigan: Mediuu; loug to oblong; skin yellow, thick, smooth; eyes shallow and small; early; yield per acre, 203 bushels; 61 per cent first grade, 23 per cent secoud grade, 16 per cent third grade; quality, first class.

CABBAGE.

The plan was to test a number of varieties iu order to determine which of them could be recommended for this climate and also to poiut out those which were not suited to Alaska. In one sense the test was a success, and iu auother a failure. The cold rainy summer was unfavorable, and only a comparatively few varieties formed heads. Taken as a whole the crop might be called a failure. The value of the experiment lies in the fact that some varieties succeeded under conditions which caused others to fail completely. The statement made in former reports, viz, that early varieties are surest headers, must be reaffirmed with emphasis. Not a single late or what might be called a main crop variety amounted to anything. And of the early sorts those with conical heads did better than the round-headed sorts. The type represented by the Early Jersey Wakefield proved to be the best under these adverse conditions. The varieties which headed took rank in the followiug order: (1) Early York; small, firm, pointed heads. (2) Early Jersey Wakefield; leaves large and spreading; small pointed heads. (3) Early Large York; small pointed heads. (4) Charleston Wakefield; small loose head, pointed. (5) Extra Early Express; small round heads. (6) Early Spring; small pointed heads. (7) Early Summer; small round heads. (8) Surehead; small oval head. (9) Succession; small round head. (10) Short Stem; small round head. (11) Dwarf Savoy; made loose, round head. (12) Drumhead Savoy; made loose, ronud head.

The following varieties were failures: Early Drumhead, Early Winningstadt, Premium Flat Dutch, Large Flat Dutch, Red Dutch, All Head, Danish Ballhead. Fottler Drumhead. All Seasons, Stonemason, Marblehead Mammoth Drumhead.

Brussels sprouts were only a moderate success.

CAULIFLOWER.

Only a few cauliflower plants were set out of each kind named below. They all produced heads, but most of them were small and not to be compared with cauliflower grown here in former, more favorable years. The result of the present season places the varieties in about the following order: (1) Early Paris, (2) Dwarf Erfurt, (3) Early London, (4) Short Stem, (5) Early Algiers, (6) Early Favorite, (7) Snowball, (8) Large Algiers.

Cauliflower develops in much shorter time than cabbage, and it can therefore be grown with moderate success in seasons when cabbage fails.

The writer has observed that there is a tendency to crowd things too much in small garden patches nearly everywhere in Alaska. This is a mistake. Crowded plants can not develop normally. Cabbages, even the early varieties, should not be planted closer than 2 feet each way, and cauliflowers not closer than 18 inches, and 2 feet is a better distance for them also.

KALE.

In former reports the qualities of kale as a vegetable adapted to Alaska were dwelt on somewhat at length. The writer feels inclined to emphasize the subject again. Kale is a vegetable which in all northern countries is more extensively grown and more highly prized than cabbage. It is hardy to a degree and in the coast region can stand out all winter, to be gathered as wanted for use. It grows remarkably well in a cold climate, and is par excellence the member of the cabbage tribe best suited to Alaska.

Another difficulty is that many housewives do not know how to use it. Kale can not be eaten raw; it must be boiled for not less than two hours, preferably with a piece of salt pork or else a piece of corned beef. During the winter season particularly there is a dearth of vegetables in Alaska. Kale will supply this lack and every garden should have a patch of it. With proper treatment it will grow anywhere, even as far north as the Arctic Circle. The seeds should be sown in a cold frame or in boxes and the plants set out like cabbages. Kale does not form a head. The plant is a bush of crisp, curly leaves and can be used from the time these leaves are deemed large enough, but it is best after it has been slightly touched with frost. A little kale was grown at the Sitka Station the past season and it did well, as usual.

BRUSSELS SPROUTS.

Another vegetable which is well adapted to Alaska is Brussels sprouts. It is seeded and transplanted in the same manner as cabbage and is sure to succeed well. The plant forms a stalk from 1 to 2 feet high, with numerous leaves up the sides, and at the base of each leaf a small head forms which is the valued part of Brussels sprouts. It was grown successfully at Sitka Station the past season.

BROAD WINDSOR BEANS.

Beans as a class do not succeed well in Alaska; the summers are not warm enough for their normal development. The Broad Windsor bean, however, dif-

fers widely from other species; it is hardier than any of the bush or pole beans commonly grown in the States. It forms a stiff, woody plant 3 to 4 feet high, and produces a number of flat, woolly pods which contain the beans, the valued portion of the crop. They are about the size of and are cooked in the same manner as Lima beans. They should, however, be gathered before they are ripe. They are at their best when they are nearly full grown, but before they begin to ripen. Indeed, they are not likely to ripen in Alaska except under particularly favorable conditions. The writer recommends all settlers in Alaska to grow a row or two of these beans in order to add variety to the list of available vegetables. The seeds should be dropped 6 inches apart in the row and be given the usual care and culture. They were successfully grown at the Sitka Station the past season.

PEAS.

Peas can be grown with reasonable success nearly everywhere, and are valued by everybody. The point the writer now wishes to make is that there is much difference between varieties, and while nearly all kinds may succeed in favorable seasons, in unfavorable seasons many sorts will fail. The two varieties that have given the most satisfaction at the Sitka Station are those which are listed in seed catalogues under the names "Alaska" and "The First and Best." These two sorts have uniformly done well, and we recommend settlers to procure them whenever practicable to do so. They are medium high, requiring brush about 4 feet tall. American Wonder and several other early sorts which are favorites in the States have not done so well at the Sitka Station as the two above-named sorts.

GARDEN AT COLDFOOT.

Judge Frank E. Howard, United States commissioner, Coldfoot, Alaska, has probably the most successful garden north of the Arctic Circle. He sent to the Sitka Station by registered mail a box which contained a cucumber, a stalk of rhubarb, two potatoes, two potato balls, and a carrot as a sample of the products of his garden. Coldfoot is located about 68° N., 60 miles north of the Arctic Circle, and the fact that he should be able to grow these vegetables to such perfection in that far northern latitude speaks volumes for the possibilities of Alaska. It is true such results are not obtained spontaneously. To grow vegetables of any kind, even with moderate success, requires judgment as to the selection of the garden and care and forethought in the cultivation of the crop. These essentials Judge Howard has supplied with magnificent results. The subjoined brief letter tells the story in a few words. The remarkable success of this garden is further testified to by Mr. C. W. H. Heideman, who made a trip through arctic Alaska the past season for the purpose of collecting specimens of the flora and also to see the country. He saw Judge Howard's garden and was struck with the possibilities it revealed. Pl. V, fig. 1, is from a photograph of the above-mentioned samples which the judge sent to Sitka Station.

COLDFOOT, ALASKA, *September 1, 1906.*

Prof. C. C. GEORGESON,
Alaska Experiment Station, Sitka, Alaska.

DEAR SIR: I send you a few samples from my garden this year, gathered at random, and not picked. I will harvest my crop about the 10th, and will then send you full report.

Rhubarb: Grown from seed planted in the house in April and transplanted to the garden May 15. Stalk, from the ground to base of leaf, 19 inches.

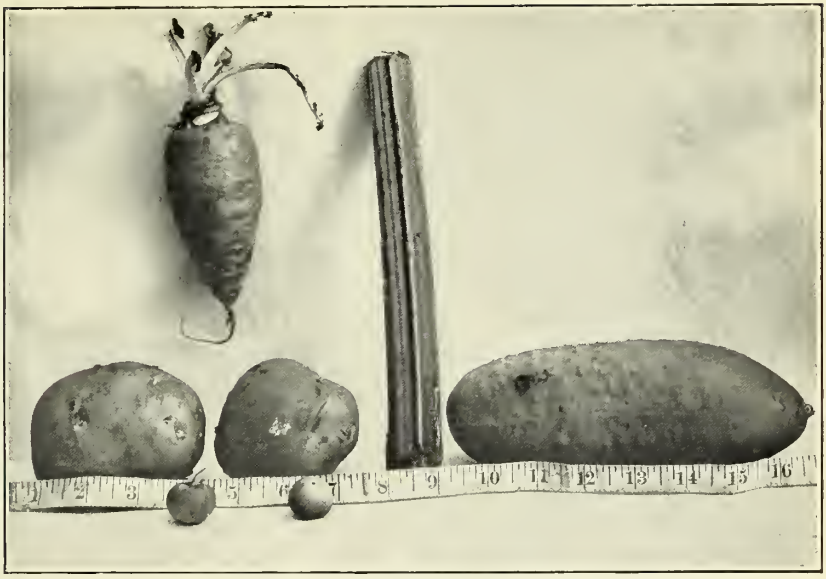


FIG. 1.—VEGETABLES GROWN AT COLDFOOT, NORTH OF ARCTIC CIRCLE. RHUBARB, CUCUMBER, CARROT, POTATOES, AND POTATO BALLS.

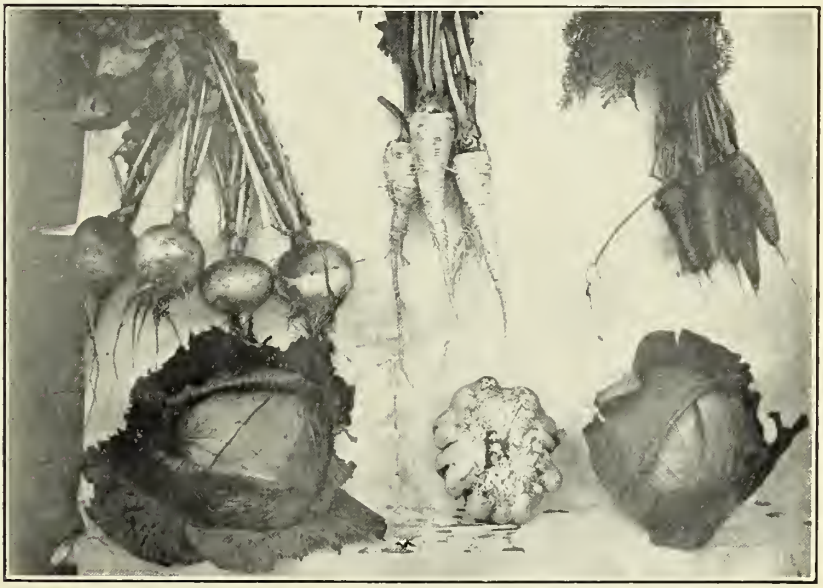


FIG. 2.—VEGETABLES GROWN BY FRED PATCHING, LORING.

Cucumber: Grown from seed planted in the house in April, and transplanted to open garden last of May.
Potatoes: Planted last of May.
Growing weather will last two weeks yet.
I can not send by mail an 8-pound head of cabbage or a 16-pound turnip.

Very truly yours,

FRANK E. HOWARD, *Commissioner.*

REPORT OF WORK AT THE COPPER CENTER STATION.

By J. W. NEAL, *Superintendent.*

INTRODUCTION.

The station now has about 40 acres under cultivation and 80 acres of pasture land fenced. There are nearly 3 miles of fence, including corrals and cross fences. Other improvements comprise a two-room cabin, provision cache and shed room, blacksmith shop and tool house, barn, root cellar, standard thermometer shelter, compost pens, etc. Eleven acres have been seeded to various grasses, and 4 acres are in winter grains, leaving 25 acres for additional crops next season. The last is now plowed up for spring seeding.

Crops were much heavier this year than last, owing to the unusual amount of rainfall during the growing season, but the wet weather kept the grains from ripening until the fall frosts set in, and even less seed matured than last year. With the exception of a few small patches of oats the farthest advanced, the entire crop was cut and cured for hay. The crop is estimated at 22 tons of dry hay.

As set forth in the field notes, each year proves the value of fallowing either old or new ground. This season a 1-acre tract of new ground yielded fully 2 tons of dry oat hay. The tract was plowed in July, 1905, and seeded to common oats late in May. Another small tract of old ground, turned but not cropped last season, produced equally as heavy a crop this year as the new ground above mentioned, while closely adjoining ground, cropped both seasons, did not yield to exceed a half ton per acre either year. In other instances where seed did not catch last year the crop this season was decidedly better than elsewhere. Still further observations showed that where the ground produced a heavy crop last year the crop was correspondingly light this year and a heavier crop where it was very light last season. At Willow Creek, 12 miles south of Copper Center, a small plat of oats growing on old ground was seen which would make more than 3,000 pounds of hay per acre. Another plat on new ground plowed this season and seeded to oats yielded, probably, a half ton per acre. Portions of the latter plat were considered too poor to cut and were pastured off. No seed matured there. This ranch is owned by Frank Bingham. He has some timothy growing which did not look very thrifty. His vegetable garden was seeded late and had not made much growth when the writer saw it. At Tonsino, 12 miles farther south, was a very fine garden owned by Jake Nafsted. He had installed a small irrigating plant, raising the water from the Tonsino River by an undershot current wheel having fruit cans nailed to the rim. The water flowed some distance through small V-shaped troughs to the garden. The river water is too cold for irrigation, but flowing through these troughs it warms up considerably before reaching the plants. At Taslena, 8 miles north of Copper Center, William Klitzke has a homestead and is slowly becoming established as a Copper Valley farmer. Last fall he succeeded in getting a small piece of ground cleared, and burned the moss off during a very dry spell of weather. There the surface is covered with from 4 to 6 inches of moss in addition to a thicket of willow and alder brush. Hav-

ing no farm implements of any kind, he made a wooden-tooth harrow and after seeding the plot to oats dragged this implement over the ground several times. The seed came up quickly and made a thick stand. He claims to have seeded one-sixth of an acre and harvested 1,500 pounds of dry oat hay. The writer saw a growing crop in full head, and, while it was a fine crop, he would not estimate it to go more than 4,000 pounds per acre.

Mr. Klitzke also had some barley growing which looked good. While he cut everything for hay, the writer doubts whether it could have matured any good seed had it been left to ripen. The crops were green August 23, and heavy frosts soon followed. Some small plats of timothy were doing well. Mr. Klitzke had a good garden, containing many of the hardy vegetables; also some potatoes from seed which was supplied him from our small home-grown stock. His vines were frosted several times during the season, but he seemed very enthusiastic over the yield, and says he will raise a ton of potatoes next year. He now has 3 acres broken for next year.

At Gulkana, 19 miles farther north, is a small garden containing most of the hardy vegetables grown in the north, including some potatoes. August 22 the potato vines were small and frozen black. The other vegetables were poor, but the writer was told they had already used the best in the road house.

At Gakona, 4 miles farther north, there was a very fine garden and grain field. Everything had been planted late and was not nearly so far advanced as the gardens and fields around Copper Center. August 22 much of the grain was just heading. The first seeding was about filled and was being cut for hay. Charles W. Bram, the manager, had seeded 3 acres to oats. The crop was estimated at 3 tons, and all the hay he has he can sell on the Fairbanks trail, 4 miles from his place, for 15 cents a pound. The Gakona garden is in a very favored spot, being sheltered from summer frosts, and always yields well.

The gardens about Copper Center this season were the best the writer has seen in the valley. G. S. Clevenger has a garden three-fourths of a mile from the station which paid him well for his careful attention. It is 50 by 100 feet and under a high state of cultivation. The soil is very sandy and about 10 feet above the Copper River. Some ashes and hen manure have been applied at different times for two years. The following vegetables were grown this year: Lettuce and radishes, which were exceptionally fine; red table beets, roots from a half to a pound; carrots, very crisp, tender roots, averaging from a fourth to a half pound each; ruta-bagas, roots firm and crisp, weighing from 6 to 7 pounds; peas, which made a slow and rather feeble growth, the pods filled poorly, many not filling at all; onions, seed planted in the open making bulbs fair size for table use; cabbage, seeded in the open ground, the first plants being frosted and nearly all killed, but new seeds planted later yielded a number of firm heads weighing from 2 to 4 pounds; potatoes, fifteen hills planted from seed grown at the station last year; the vines of the potatoes were frozen back twice soon after they came up, but the third sprouting made good sized tops and blossomed. The vines were frosted again in August, after which Mr. Clevenger cut the injured tops off and covered each hill with burlap. Single hills yielded 3 to 5 pounds of marketable potatoes.

Judge Holman, of Copper Center, had a very fine garden, raising about 40 bushels of root vegetables, including 450 pounds of potatoes.

THE STATION GARDEN.

Few vegetables were grown at the station this year, as attention was given largely to field crops. The following varieties were grown in small quantity:

Purple Top White Globe turnip: Seeded May 28; June 15, only a few came

up; July 1, making good growth; roots weighed 4 to 8 pounds by the end of the season.

White Flat Strap Leaf turnip: Seeded May 28, coming up June 8; July 1, tops making thrifty growth; many roots weighed 2 to 3 pounds, measuring 6 inches across.

Crimson Globe beets: Seeded May 28, coming up June 11; July 1, making good tops; the roots attained a fair size, measuring 6 to 10 inches around.

Bassano beets: Seeded May 28, coming up June 15; July 1, making rapid growth; August 1, growth still vigorous; the roots were slightly smaller than Crimson Globe.

Champion ruta-baga: Seeded May 28, slow in coming up; July 1, growth vigorous; roots did not get large, averaging 9 inches around.

Yellow Swede: Seeded May 28; made very fine smooth roots, weighing from 2 to 4 pounds.

Scarlet Horn carrots: Seeded May 28; very slow in coming up and the growth slow; by fall the roots measured 3 to 6 inches around; excellent quality.

Alaska peas: Seeded May 28, coming up June 6; made a good growth and began blooming July 4; many pods set on the vines, but only a small per cent filled.

Prolific Early Market peas: Seeded May 28, coming up June 10; made about the same growth as the Alaska. Either variety usually does well here.

Cabbage: Some seed was planted singly in pots and set in a hotbed about May 1. The plants were set in the garden June 10. The pots were milk tins unsoldered and wrapped with twine, and the plants were easily transplanted without disturbing the roots. The plants made a vigorous growth and headed, the largest being the size of a 2-quart cup.

Broccoli: Seeded and transplanted with the cabbage, made fair-sized plants, but only one came to head, it being about the size of a large teacup.

Kale: Seeded May 28, up June 10; growth slow at first; plants were good size by the end of the season.

Rhubarb: Old plants made good growth. The first cutting was made June 8, making several cuttings during the season. The stalks were tender and juicy until late in September.

Beans: One row each of Broad Windsor and Horse bean was seeded May 30. Each made good stalks, blossomed and set good pods, but were killed by frost before the beans were ready for table use.

Potatoes: Three varieties were planted May 19, in warm new-ground soil which had been broken up in July, 1905. After the ground was thoroughly worked small trenches were made the depth of a miner's shovel and half filled with fresh stable manure. The dirt was then raked back and the whole surface made level. Stakes had been driven to locate the trenches, and after restretching the line over the center of the trenches the potatoes were planted under the line 2 inches deep and 10 inches apart in the row, leaving about 1 inch of soil between the potatoes and the manure. The rows were only 2 feet apart, which is a little close for hilling, but the ground was thoroughly shaded by the vines, which helped to retain the moisture. The seed potatoes were grown at the station last year and kept in the root cellar through the winter. They were removed to a warm room early in May and well sprouted before planting. The potatoes were rather small and planted whole, dropping one potato in a place. All varieties were coming up by May 27. The vines were frozen to the ground May 31. New growth began to appear above ground June 8. July 1 the vines were making a vigorous growth and sending out flowering stems. Some blossoms appeared by July 10. The top leaves were frosted July 16. Another frost

August 8 killed the top leaves, and was followed by light injuries from frost August 16, 22, 24, 29, and September 4, when the vines were killed to the ground. The vines were cut off at once and the potatoes dug September 8. During the entire season there was no noticeable difference in the different varieties. About 10 feet of each row came on old ground not trenched or fertilized. These made less top growth and one-fourth less yield. Each variety occupied two rows 49 feet long. Extra Early Ohio yielded 125 pounds, Garfield 115 pounds, and Freeman 135 pounds, totaling 375 pounds on the plat 14 by 49 feet. After the small ones were culled out there were 350 pounds of marketable potatoes, many of them weighing 8, 12, and 16 ounces each. Probably 98 per cent were smooth, choice potatoes. This plat yielded at the rate of 22,050 pounds of marketable potatoes per acre and 1,575 pounds too small to market, which we used on our own table.

NURSERY.

A number of apple grafts and seedlings, also a few raspberry, currant, and gooseberry roots, were received last year and set in nursery form. Only a small percentage started last year, and these made little growth. Two apples, eight currants, two raspberries, and one gooseberry lived through the winter and made a slow start this season. The apples made 4 inches growth, currants 3 to 6 inches, raspberries 24 inches, sending out four canes each. The gooseberry is dead.

GRASSES.

Many of the grasses seeded in former years have died out or made little growth this year. They were on very dry soil and suffered for want of moisture. This season a tract of heavy moist soil was selected and the following grasses seeded June 2 in plats 20 by 60 feet:

Alsike clover: Up June 12, made rapid growth, but plants soon begun to turn very yellow, perhaps caused by the roots running down into the cold clay subsoil. Plants slender; season's growth, 8 to 10 inches. A small plat seeded in the yard late in June on manured new ground made a better showing; season's growth 12 to 14 inches and thick all over the ground. This plat maintained a good color throughout the season. The soil is light with sandy subsoil.

Alfalfa: Lot "A" (Yellow as Gold). Seed from Ogden, Utah, up well June 11; season's growth 8 to 12 inches; good stand. As the season advanced the plants turned very pale yellow and took on a sickly appearance, evidently caused by the roots striking the frost still in the clay subsoil. The plat is on heavy black soil with a stiff clay subsoil, which is doubtless too cold for either alfalfa or clover. Better results may be obtained on the lighter and warmer soil.

Agropyron tenerum: Up June 12. Season's growth 20 inches. Very promising.

Festuca elatior: Up June 13. Season's growth covered the ground well.

Hassock grass: Did not come up.

Holcus lanatus: Up thick June 13. Season's growth covered the ground well.

Redtop: Up June 12. Stand good. Season's growth 6 to 10 inches.

Orchard grass: Up June 13. Good stand. Season's growth 12 inches.

Timothy: Up June 11. Stand good. Season's growth 12 to 18 inches; headed. Timothy seeded in the yard as a lawn grass in August, 1905, on new ground highly fertilized with fish guano made a fine crop of hay this season. The ground being broken in July, it became dry and dusty, but the seed was sown some time in August in hopes of rain to sprout it. The seed did not come up

FIG. 1.—ONE OF THE GRAIN PLATS AT COPPER CENTER STATION.

FIG. 2.—SHOWING EFFECT OF FERTILIZERS ON OATS—FERTILIZED AT RIGHT; NO FERTILIZER AT LEFT.

until in September and made little growth that fall. In fact, but a small percentage of the seed germinated that fall. In the spring of 1906 it came up very thick, as it had been seeded thick to get a quick sod. The growth was slow at first, but the season turned out quite favorable, and it made a fine crop, although very irregular in height. It headed well, and the seed was nearly matured when the frosts set in. The crop was cut for hay and weighed when cured and baled. The plat is 22 feet wide and 68 feet long. It yielded 215 pounds of dry hay, or 6,114 pounds per acre. Two acres of very low and wet ground were seeded to timothy with oats May 30. It made only a fair stand and not much growth.

Essex Rape: Up June 10. Season's growth 8 to 14 inches. Injured by frost July 15; August frost killed the top.

Bromus inermis: Seedings of 1903–4 made good pasture by May 15. At that date outside seed was just starting growth. June 15, 10 to 16 inches high; July 1, headed, seed stems 24 to 30 inches high; July 15, blooming; little seed matured. This grass is valuable for spring pasture, but does not yield enough to be profitable as a hay crop. Seedings of 1906 made about the same showing as former seedings did their first season. Nearly 7 acres are seeded to this variety, but is not believed to be as profitable as oat hay at present prices.

FIELD CROPS.

Most of the following were seeded in four different tracts and at as many different dates on the various kinds of soil, comparing also fertilized and unfertilized tracts. For convenience, in this report tracts on which observations are given will be classed as tracts A and B (Pl. VI, figs 1 and 2). Tract A is new ground, summer fallowed, fertilized with guano at the rate of probably 400 pounds per acre. Tract B is old ground, cropped last year, and without fertilizer of any kind used.

WHEAT.

Romanow: Tract A, seeded May 11; up in thirteen days; stand thin; heading July 12; blooming July 27; height, 40 to 48 inches. No seed matured. Tract B, seeded May 12; up in thirteen days; stand thin; heading July 14; blooming July 31; height, 40 to 42 inches. No seed matured.

Saskatchewan Fife: Tract A, seeded May 11; up in twelve days; stand fair; heading July 14; bloom notes lost; height, 46 inches. No seed matured. Tract B, seeded May 12; up in ten days; stand good; heading July 18; bloom notes lost; height, 30 to 40 inches. No seed matured.

Romanow, S. P. I. No. 8892: Tract A, seeded May 11; up in thirteen days; stand fair; heading July 11; blooming July 27; height 50 inches. No seed matured. Tract B, seeded May 12; up in ten days; stand good; heading July 12; blooming July 26; height 40 inches. No seed matured.

Velvet Chaff Blue Stem: Tract A, seeded May 11; up in eleven days; stand fair; heading July 15; bloom notes lost; height 48 inches. No seed matured. Tract B, seeded May 12; up in ten days; stand good; heading July 14; bloom notes lost; height 30 to 40 inches. No seed matured.

Glyndon: Tract A, seeded May 11; up in thirteen days; stand thin; heading July 13; bloom notes lost; height 40 inches. No seed matured. Tract B, seeded May 12; up in twelve days; stand fair; heading July 14; bloom notes lost; height 36 inches. No seed matured.

Ladoga: Tract A, seeded May 11; up in twelve days; stand fair; heading July 14; blooming July 27; height 48 to 54 inches. No seed matured. Tract B, seeded May 12; up in ten days; stand good; heading July 13; blooming July 26; height 33 to 36 inches. No seed matured.

Early Riga: Tract A, seeded May 11; up in twelve days; stand fair; heading July 5; blooming July 15; height 40 inches. Seed was nearly matured when killed by frost. Tract B, seeded May 12; up in ten days; stand good; heading July 5; blooming July 15; height 24 to 36 inches. No seed matured.

Plumper: Tract A, seeded May 11; up in thirteen days; stand thin; heading July 6; blooming July 17; height 40 to 45 inches. No seed matured. Tract B, seeded May 12; up in thirteen days; stand thin; heading July 5; blooming July 20; height 30 to 40 inches. No seed matured.

Preston: Tract A, seeded May 11; up in twelve days; stand good; heading July 13; blooming July 20; height 50 inches. No seed matured. Tract B, seeded May 12; up in ten days; stand good; heading July 13; blooming July 31; height 42 inches. No seed matured.

Romanow, "True Stock:" Received June 7 and seeded at once in tract A; up June 13; heading August 15; blooming very late; height 44 to 50 inches. No seed matured.

Harold: Tract A, seeded May 11; up in thirteen days; stand thin; heading July 5; blooming July 15; height 40 inches. No seed matured. Tract B, seeded May 12; up in twelve days; stand fair; heading July 5; blooming July 15; height 24 to 36 inches. No seed matured.

Romanow (Sitka seed): Tract A, seeded May 11; up in thirteen days; stand thin; heading July 14; blooming July 26; height 50 to 60 inches. No seed matured. Tract B, seeded May 12; up in thirteen days; stand thin; heading July 15; blooming July 27; height 40 to 47 inches. No seed matured.

Dufferin: Tract A, seeded May 11; up in twelve days; stand fair; heading July 5; blooming July 16; height 42 to 50 inches. No seed matured. Tract B, seeded May 12; up in eleven days; stand good; heading July 8; blooming July 26; height 30 to 38 inches. No seed matured.

Romanian: Tract A, seeded May 11; up in thirteen days; stand fair; heading July 13; bloom notes lost; height 50 inches. No seed matured. Tract B, seeded May 12; up in twelve days; stand fair; heading July 14; bloom notes lost; height 24 to 40 inches. No seed matured.

Stanley: Tract A, seeded May 11; up in twelve days; stand good; heading July 13; blooming July 25; height 50 to 52 inches. No seed matured. Tract B, seeded May 12; up in twelve days; stand fair; heading July 14; blooming July 31; height 24 to 40 inches. No seed matured.

Ebert: Tract A, seeded May 11; up in twelve days; stand good; heading July 8; blooming July 17; height 44 inches. No seed matured. Tract B, seeded May 22, it being missed on the 12th; up May 29; heading July 10; blooming July 28; height 30 to 36 inches. No seed matured.

BARLEY.

Chevalier: Tract A, seeded May 10; up in eleven days; stand good; heading July 3; blooming July 10; height 32 to 38 inches. A few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 2; blooming July 10; height 24 to 28 inches. No seed matured.

Trooper: Tract A, seeded May 10; up in eleven days; stand good; heading July 4; blooming July 12; height 40 to 42 inches. Only a few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 12; blooming July 15; height 24 to 30 inches. No seed matured.

Black Hulless: Tract A, seeded May 10; up in twelve days; stand fair; heading July 6; blooming July 13; height 34 inches. A small amount of seed matured. Tract B, seeded May 12; up in ten days; stand fair; heading July 7; blooming July 14. No seed matured.

Sisolsk: Tract A, seeded May 10; up in eleven days; stand good; heading July 5; blooming July 12; height 40 to 45 inches. A few heads matured. Tract B, seeded May 12; up in eleven days; stand good; heading July 7; blooming July 14; height 30 to 36 inches. No seed matured.

Champion: Tract A, seeded May 10; up in eleven days; stand good; heading July 4; blooming July 12; height 40 inches. A few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 5; blooming July 13; height 28 inches. No seed matured.

Odessa: Tract A, seeded May 10; up in eleven days; stand good; heading July 7; blooming July 15; height 40 to 42 inches. A few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 8; blooming July 16; height 24 inches. No seed matured.

Manchuria: Tract A, seeded May 10; up in twelve days; stand good; heading July 7; blooming July 14; height 40 to 44 inches. A few heads matured. Tract B, seeded May 12; up in eleven days; stand good; heading July 8; blooming July 16; height 24 to 30 inches. No seed matured.

Hannah Fall: Tract A, seeded May 10; up in eleven days; stand good; heading July 8; blooming July 15; height 40 inches. A few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 11; blooming July 18; height 30 inches. No seed matured.

Manshury: Tract A, seeded May 10; up in twelve days; stand good; heading July 7; blooming July 14; height 40 inches. A few heads matured. Tract B, seeded May 12; up in twelve days; stand good; heading July 8; blooming July 15; height 40 inches. No seed matured.

Hannah, S. P. I. No. 9133: Tract A, seeded May 10; up in eleven days; stand good; heading July 7; blooming July 15; height 32 to 36 inches. A few heads matured. Tract B, seeded May 12; up in nine days; stand good; heading July 8; blooming July 16; height 26 to 30 inches. No seed matured.

Tennessee Winter, S. P. I. No. 15829: Tract A, seeded May 10; up in eleven days; stand good. Did not send up any stalks until very late in the season, but made a thick, matted, short growth. The few stalks sent out late headed early in August. Did not bloom. Height 40 inches. Tract B, seeded May 12; up in ten days; stand good; behavior about as in tract A. The few stalks sent up were heading August 20. Height 26 inches. Did not bloom.

No barley matured on the station, except in plat A, which is on light, warm soil in the yard and at the edge of a high bank, which tract escapes all light frosts, and the heavier frosts do little damage. The barley was killed on other parts of the station by frost August 24. The barley in plat A was slightly injured, but some of the seed will grow. It matured early in September. Chevalier, Champion, Manchuria, and Odessa ripened a little earlier than other varieties.

OATS.

Tartar King: Tract A, seeded May 10; up in twelve days; stand good; heading July 12; blooming July 21; height, 40 to 46 inches. Some heads matured. Tract B, seeded May 12; up in eleven days; stand good; heading July 18; blooming July 27; height, 28 to 36 inches. No seed matured.

Banner: Tract A, seeded May 10; up in eleven days; stand good; heading July 12; blooming July 22; height, 44 to 50 inches. A few heads matured. Tract B, seeded May 12; up in eleven days; stand good; heading July 19; blooming July 29; height, 20 to 36 inches. No seed matured.

Sixty Day: Tract A, seeded May 10; up in thirteen days; stand good; heading July 12; blooming July 20; height, 44 inches. A few heads matured. Tract B, seeded May 12; up in thirteen days; stand good; heading July 19; blooming July 29; height, 20 to 36 inches. No seed matured.

Finnish Black: Tract A, seeded May 10; up in twelve days; stand good; heading July 6; blooming July 16; height, 52 to 58 inches. A small amount of seed matured. Tract B, seeded May 12; up in twelve days; stand good; heading July 12; blooming July 25; height, 40 to 44 inches. No seed matured.

Burt Extra Early: Tract A, seeded May 10; up in thirteen days; stand good; heading June 29; blooming July 13; height, 40 to 44 inches. A few heads matured. Tract B, seeded May 12; up in thirteen days; stand good; heading July 2; blooming July 14; height, 36 inches. No seed matured.

Swedish Select: Tract A, seeded May 10; up in twelve days; stand good; heading July 10; blooming July 18; height, 40 to 45 inches. A few heads matured. Tract B, seeded May 12; up in twelve days; stand good; heading July 13; blooming July 20; height, 30 to 40 inches. No seed matured.

Belyak, S. P. I. No. 10624: Tract A, seeded May 10; up in fourteen days; stand thin; heading July 14; blooming July 25; height, 48 to 50 inches. No seed matured. Tract B, seeded May 12; up in thirteen days; stand good; heading July 19; blooming July 30; height, 24 to 33 inches. No seed matured. It may be noted that a few heads matured in tract A and none in tract B.

A small amount of oats matured in the large field plats on light, dry soil near the high bank mentioned elsewhere in this report. A small percentage of that saved was frosted August 24, but most of the seed looks good. The following varieties and amounts were cradled and flailed out for seed: Finnish Black, 150 pounds; Banner, 70 pounds; Burt Extra Early, 32 pounds; Swedish Select, 45 pounds; or 290 pounds in all. These varieties were ripe enough to cut September 5, Burt being a little later than the other three varieties named. Sixty Day was still later under same conditions and nearly all killed by frost. The five varieties were seeded with horse drill May 16 and 17 on like soil and location.

MILLET.

Three varieties of millet were received in July and seeded at once, but too late to come to anything.

QUINOA.

Common: Seeded May 22; up June 2; stand thin; growth feeble; plants 16 to 24 inches high. No seed matured.

True: Seeded May 22; up June 2; stand thin; growth somewhat stronger than the Common; plants 24 to 30 inches high. No seed matured.

BUCKWHEAT.

Silver Hull: Home seed from crop 1903. Seeded May 11; up May 24; stand fair; blooming July 2; height, 15 to 20 inches; damaged by frost July 15; killed by frost July 24.

RYE.

Rye, S. P. I. No. 11268: Seeded May 16; up May 26; stand good; heading June 27; blooming July 12; height, 40 to 48 inches. No seed matured.

The above rye is said to be a winter variety. It made a fine crop of hay from spring seeding. The same seeded late in July with winter wheat is now 15 inches high and heading September 25. With this growth and behavior it can not stand our cold winters.

Spring rye ("True Stock"): Tract A, seeded May 11; up in eleven days; stand good; heading June 25; blooming July 11; height, 48 to 56 inches. Seed nearly matured when frosted. Tract B, seeded May 12; up in ten days; stand good; heading June 27; blooming July 12; height, 48 to 52 inches. No seed matured.

WINTER GRAINS.

Several varieties of winter wheat and rye were seeded July 27 and duplicated August 3, 1905. They all came up quickly and covered the ground well by winter. There was an unusual abundance of rabbits last fall, and before the snow fell they had eaten the grain off very close to the ground, which caused much of the grain to be winterkilled and also retarded the spring growth of what lived through.

Kharkov wheat, S. P. I. Nos. 9125, 9129, 2955, and 2956 were seeded. A few stalks of No. 9129 lived through, but made a slow start and headed several days later than spring seedings. The straw did not ripen, and the grain was killed by frost before it was filled. The other varieties were all winterkilled.

Rye, S. P. I. No. 5905 was all winterkilled.

Excelsior Winter: A few stalks lived, heading June 20; blooming July 12; height, 42 to 54 inches. Seed nearly matured when killed by frost August 24.

Winter rye (var.?): A few stalks lived through, heading June 22; blooming July 10; height, 54 inches. Seed nearly matured when killed by frost August 24.

Amber rye: A fair stand lived through, heading June 18; blooming July 1; height, 48 to 54 inches. A few heads matured fair seed.

REPORT OF WORK AT THE RAMPART STATION.

By Fred E. Rader, *Superintendent.*

GENERAL OBSERVATIONS.

The growing season of 1905 closed very early. There was snow and rain September 8 and a snowfall of 1½ inches on September 10, most of which melted in a few days. Again, between September 15 and September 18, 5¾ inches of snow fell, the greater part of which did not leave the ground until spring. The snowfall for the entire winter amounted to 48 inches, which is considerably more than the average. The winter was considered an unusually cold one. There were a number of periods of low temperatures and an especially severe one during the month of January. The lowest temperature for the winter, —66° F., was registered on January 18. For a period of twenty days—from January 5 to January 24, inclusive—the average minimum temperature was —56.9°. The mean minimum for the month was —44°, and the mean maximum —29.7°. But with all the low temperatures fall grain, pansies, rutabagas, and parsnips, which had been left in the ground, survived in perfect condition. This was, no doubt, due to the protection afforded by the thick covering of snow and also to the fact that there was a considerable amount of snow on the ground before there was any freezing weather.

The spring was rather late this year. Fall rains had saturated the ground so well and the heavy snow required so long a time to melt that none of the ground was in condition to be plowed and seeded until May 26, eight days later than last year, and land that had been previously cleared but not broken up could not be plowed before June 9.

A predicted overflow of the Yukon River became a reality, and on May 31 the present station residence, a log cabin near the bank of the river, had to be abandoned. The water began to recede June 5, and ten days later the cabin was dry enough again for occupancy. The cleared land is on higher ground, and no damage was done beyond spoiling the kitchen garden and filling the cabin with mud and trash. The new cottage stands back from the river on the cleared land, where there is no danger from overflows.

Taken as a whole, the summer was an especially favorable one for growing grains and vegetables. A comparison with the average temperatures for June, July, and August of last year shows an average nearly 3° higher for this season. It was a little dry during June and somewhat too wet and cloudy during the latter part of August, but everything on the station did well in spite of late planting, and the vegetable gardens in this vicinity were uniformly a success.

There was a very noticeable improvement in the productiveness of the soil cropped for the second time this season. Last year, except where piles of stumps and brush had been burned, the growth of grain was very poor and spindling, but this year it was uniformly good everywhere. A plat put in potatoes last year and yielding no more than the seed planted, this year gave a yield of sixfold without the application of fertilizer of any kind.

The first frost came August 25, the thermometer falling 7° below freezing. This killed wax beans and buckwheat and injured potatoes, peas, and broccoli. Other vegetables and grains were apparently uninjured. There have been a number of frosts since, but the lowest temperature up to the present time, September 26, has been 9° below freezing. There has been no snow yet even on the hills about here.

No additional land was cleared during the summer. Besides caring for the crops and making hay, a road one-fourth mile long, extending from the river to the cleared land, has been almost completed, and a five-room frame cottage, 28 by 30, with wood shed attached, is under construction. It is hoped to complete the exterior work on the cottage before cold weather sets in. The interior work will be done during the winter. A log barn and implement shed, 30 by 30, is also in process of construction and will be practically completed by the end of the month. One laborer has been employed since July 1.

During the summer a side-hill plow and a stump puller were added to the station's equipment, and on September 18 Mr. D. C. Witherspoon, of the United States Geological Survey, turned over to the station two of the best horses he had used in a pack train during the summer. The work has progressed to a state where it is necessary that the station own its own team. It has proven a great annoyance, as well as an expenditure of much time and labor, to transfer a team back and forth across the river. With the aid of the team and the stump puller it is hoped that a considerable acreage can be added to the clearing next summer.

WINTER GRAINS.

The following winter grains were seeded August 18, 1905, on land which had never previously been cropped, and the results can be considered very good. The season closed so early that the grains did not make a good growth, and it was feared that they would be killed by the severe cold weather, but they survived the winter in splendid condition and began growing vigorously as soon as the weather was favorable. Since 1900 rye has never failed to winter successfully:

Amber Winter rye: June 15, an occasional head; July 2, fully headed and in bloom; July 15, grain in milk; August 1, grain in hard dough; August 18, ripe and harvested. It grew to an average height of 48 inches. The heads were short, but well filled, and the grain is plump.

Giant French Winter rye: June 15, an occasional head; July 2, headed and in bloom; July 20, grain in milk; August 10, grain in hard dough; August 31, ripe and cut. Average height 54 inches; heads of good length.

Excelsior Winter rye: Practically same as Giant French.

Kharkov Winter wheat: In early part of season did not do well. July 2, partially headed; July 20, fully headed; August 10, grain in soft dough, doing

better than early in season; September 5, part of it ripe and cut; remainder cut September 10. Did much better than last year and seems more promising.

It was planned to seed a considerable portion of the cleared land to winter grain this season, but the necessary seed did not arrive until August 24, too late to insure a good growth this fall, so only small plats of the following varieties were seeded. They have come up and have made a fair growth, but the weather since the seeding has been more favorable than usual. Varieties seeded were: Kharkov Winter wheat, S. P. I. No. 12001; Winter barley from Bulgaria, No. 521; Winter barley from Bulgaria, No. 522; Winter rye, No. 11268; Snoma Winter oats, No. 274; Tennessee Winter barley.

SPRING GRAINS.

The number of varieties of spring grain was not very great, owing to a lack of seed. In most cases the stand was rather thin; it was seeded that way in order to give the individual plants plenty of room to develop. The wet weather during the latter part of August not only retarded ripening but also developed an undesirable feature in the barley and oats. It caused additional stalks to come up from the roots of the plants, and these were just in head when the rest of the grain was ripe. This may have been due to the wet weather, to thin seeding, to a peculiar condition of the soil, or to a combination of several of these causes. A beginning was made in the development of earlier ripening varieties by the selection of the earliest ripening heads of each variety grown. These will be propagated by themselves next season.

Manshury barley: Seeded May 26; June 5, coming up; grew quite rapidly, and by July 14 was fully headed; July 20, in bloom; August 10, grain in dough; August 27, first heads ripe; September 15, harvested. Grew to average height of 30 inches. Fine large heads.

Lapland barley: Seeded May 26; June 5, coming up; grew very well, and by July 14 was fully headed; August 20, first heads ripe; September 12, ripe and cut. Very similar to Manshury except a little earlier this year.

Two-rowed barley: Seeded May 30; June 15, fair stand, 1½ inches high; July 14, heading; August 10, grain in soft dough; September 12, ripe and cut.

Saskatchewan Fife wheat: Seeded May 30; June 8, coming up; August 1, fully headed; August 10, in full bloom. Did not develop further than dough state of grain. Similar result last year.

Spring rye: Seeded May 30; June 8, coming up; July 20, fully headed; August 1, in bloom; did not mature; the reason is not known. It heads and blooms early enough, but for some reason approaches maturity too slowly. Did the same way last year.

Burt Extra Early oats: Seeded May 30; June 10, coming up; July 20, headed; August 1, in bloom; August 10, grain in milk; September 1, first heads ripe; September 15, harvested. Not a very desirable variety. Straw short and fine and heads small.

Finnish Black oats: Seeded May 26; germinated poorly; July 20, fully headed; August 1, in bloom; August 10, grain in milk; September 15, cut. A tall variety with large heads. A very desirable variety for this latitude if it can be made to mature earlier.

Russian buckwheat: Seeded May 30; June 15, coming up rather slowly; July 20, growing well; blooming profusely; killed by frost August 25; one-fourth crop ripe.

POTATOES.

Early Rose: Seed grown by the station in 1905. The sprouts were started by keeping them in a warm place for some time. Planted May 28. Part of

them were planted by placing each potato in the ground by hand, care being taken not to break off the sprout. The remainder were covered with a hoe in the ordinary way. Those planted with extra care came up soonest, grew the largest tops and the most mature potatoes, and produced nearly twice as much as those planted in the ordinary way.

Burbank: Rampart seed grown by Capt. A. H. Mayo. Planted June 2. Grew well and produced tubers of good size.

The potatoes were a good crop. Part of the ground was fertilized with barnyard manure. The average yield altogether was about tenfold. The quality is good.

GARDEN VEGETABLES.

Early Alaska peas: Seeded June 2; grew splendidly; July 25, first pods large enough for use; produced well for a month. A splendid variety.

Prolific Early Market peas: Practically same as above.

Marblehead Mammoth peas: Seeded June 2; a large late variety; pods large enough for use by August 18.

Beets: Three varieties were seeded June 2—Crimson Globe, Dirigo, and Detroit Dark Red. All produced beets of good size. All have a tendency to go to seed, the last-named variety perhaps most of all.

Hollow Crown parsnip: Seeded June 4; very slow in coming up; produced some roots of fair size.

Scarlet Horn carrot: Seeded June 4; grew very slowly for the first month; produced a very good crop.

Yellow Danvers and Extra Early Brown Spanish onion: Very few seed germinated.

Thorburn Improved ruta-baga: Seeded June 4; came up a fine stand; August 10, some large enough for use; produced a fine crop.

Purple Strapleaf turnip: Seeded June 4; came up fine stand and grew splendidly; large enough for table use by July 20.

Early Scarlet Turnip radish: Seeded at intervals during the summer and produced radishes in four weeks from time of seeding.

Long Black Spanish radish: A good one of the long kinds. Produced edible radishes in five weeks from time of seeding.

Lettuce: Morse, Hanson, San Francisco Market, Early Prize Head, California Cream Butter, and Philadelphia Butter were grown. Have had lettuce in abundance from June 1 to the present time. The curly leafed varieties did better and were more satisfactory than the Butter lettuce.

Early Red Valentine Dwarf bean: Seeded June 4; came up nicely and grew well, but did not form pods before the frost of August 25.

Davis Wax Dwarf bean: Seeded June 4; grew splendidly; by August 22 produced edible pods 6 to 7 inches long.

White Spine cucumber: Started in the hot bed in cans and transplanted to the open ground June 8; stayed alive all summer but made very little growth.

Improved White Plume celery: Seed started in window boxes; transplanted to cold frame after other things were taken out; has done well and is ready to blanch.

Early Jersey Wakefield cabbage: Transplanted June 8; grew well and began heading August 10; has done the best of any. Produced a number of good solid heads. Pressure of other work caused cabbages to be neglected, otherwise all varieties would have done better.

Early Flat Dutch cabbage: Transplanted June 8; grew fairly well and produced several firm round heads weighing 2 to 3 pounds.

Premium Flat Dutch: Transplanted June 8; grew well and produced several nice heads.

Brussels sprouts: Transplanted June 8; one-fourth of the plants grew nice sprouts.

Broccoli: Transplanted June 8; one-tenth of the plants produced heads 5 to 6 inches in diameter.

Siberian kale: Transplanted June 8; has done well.

Cabbage, broccoli, Brussels sprouts, and kale were seeded in the open ground June 4. With the exception of the kale none did as well as the transplanted plants.

GRASSES.

With a view to testing their adaptability to this climate the following grasses were seeded June 13 in plats 13 by 15 feet. The seed was old and several varieties did not come up well. The surface soil was also dry at the time of seeding and germination did not take place until rain had fallen.

Kentucky blue grass (*Poa pratensis*): A fair stand; made growth 4 to 5 inches high.

Redtop (*Agrostis vulgaris*): Good stand and good growth.

English blue grass (*Festuca pratensis*): Fine stand; grew 10 inches high.

Meadow foxtail (*Alopecurus pratensis*): Did not germinate well.

Tall meadow oat grass (*Avena elatior*): Thin stand, but some grew 24 inches high.

Orchard grass (*Dactylis glomerata*): Made a good sod.

Timothy (*Phleum pratense*): Grew very well, some 12 inches high.

Awnless or smooth brome grass (*Bromus inermis*): Did not come up well.

Tall meadow fescue (*Festuca elatior*): Did not germinate well.

Meadow soft or velvet grass (*Holcus lanatus*): Made a good thick soil.

Perennial rye grass (*Lolium perenne*): Grew 10 inches high.

White clover (*Trifolium repens*): Came up good stand, but did not grow more than 1 inch high.

REPORT OF WORK AT THE KENAI STATION.

By P. H. Ross, *in Charge*.

THE WEATHER.

The ground firmed sufficiently by May 9 to allow starting the disk harrow. As is the case every season, the ground had been miry for a time after the removal of the snow and the thawing of the ground. The drying progresses very slowly. When the surface is stirred it dries out quickly and becomes firm, remaining so the rest of the season. As usual, there was very little rainfall in May and June. It did not amount to 0.75 inch during the sixty-one days. During the whole summer the usual southwest winds were almost totally absent, and this fact, combined with a liberal rainfall in July and August, accounts for the rank growth of crops, the yield of hay being the heaviest of any raised at the station. There were but eleven clear days during these two months, and on thirty three days during the same time rain fell in measurable quantities. In spite of the rainy weather all but a small percentage of the hay crop was saved in almost perfect condition. Last year the crop was put up with even better success. A detailed account of the methods followed to procure these results has already been published.[a]

[a] Alaska Sta. Bul. 3.

NEW BUILDINGS.

During August, at rainy intervals, when haymaking could not be carried on, three new buildings were erected, consisting of a wood shed (8 by 14 feet), a blacksmith shop (14 by 20 feet), and an implement shed (14 by 20 feet). A quantity of sheet tin damaged by fire was procured from the Kussiloff cannery to be used as a covering for these buildings, and when this was given a coat of coal tar it served its purpose perfectly. A portion of the hay shed heretofore used as a blacksmith shop and an implement shed combined now gives room for a great quantity of hay.

CROPS.

All the cultivated land except a small area seeded to grasses, vegetables, and fruits was sown to field oats, it being the only grain grown at the station this year. The crop was not planted with the hope of seeing it mature, but the prime object was to raise feed enough for the stock. Haymaking began when the grain was in the milk. The following is a record of the growth on the different plats:

Field C, sown May 18 and 19; field B, sown May 24, 25, and 26; field A, sown May 27 and 28. June 15, field A, 2 to 3 inches high, fair stand; field B, 2 to 3 inches high, fair stand; field C, 3 inches high, fair stand. July 1, field A, 4 to 6 inches high, last year's application of manure indicated by increased growth; field B, 4 to 6 inches high; field C, 5 to 10 inches high, growth spotted. July 20, field A, 3 to 20 inches high; field B, 6 to 18 inches high; field C, 10 to 20 inches high. August 1, field A, 8 to 40 inches high; field B, 12 to 30 inches high; field C, 12 to 36 inches high. August 15, field A, 12 to 46 inches high; field B, 24 to 36 inches high; field C, 24 to 42 inches high.

Field C was very spotted, the greater part making a sickly, yellow growth. The yield of this field was less than 1 ton to the acre. In field A the area over which the stable manure was distributed last year showed a rank, heavy growth. On ground not so fertilized the growth was much lighter and thinner. Field B showed a good uniform growth, its yield of hay being estimated at 2 tons per acre.

GRASSES SEEDED 1903.

June 1: Timothy, 6 inches high, spreading. Meadow foxtail, 4 inches high; mixture partly winterkilled. Smooth brome grass, 6 to 8 inches high, has spread so that drills can no longer be distinguished.

June 18: Redtop 6 to 8 inches high. Timothy 8 inches high. Meadow foxtail 24 inches high, headed and in bloom. Smooth brome grass 10 inches high.

July 2: Redtop 12 inches high. Tall fescue 24 inches high. Timothy 12 inches high. Smooth brome grass 18 inches high. Meadow foxtail 24 inches high, fully headed.

July 20: Redtop 18 inches high. Tall fescue 24 to 36 inches high. Timothy 20 to 30 inches high, fully headed. Alsike clover in bloom, vigorous. White clover very short growth. Meadow foxtail 30 inches high. Smooth brome grass eaten down by cattle.

August 1: Redtop 30 inches high. Tall fescue 48 inches high, in bloom. Timothy 40 inches high. Alsike clover 18 inches high, going out of bloom. Smooth brome grass 20 inches high, not looking well.

August 15: Tall fescue 40 to 72 inches high. Redtop 30 inches high. Timothy 36 inches high. Meadow foxtail 48 inches high, very thin. These grasses were cut for hay August 24. No seed had ripened.

GRASSES SEEDED 1904.

June 1: Tall fescue 4 inches high. Tall oat grass 4 inches high, poor stand. Timothy 4 inches high. Smooth brome grass 6 inches high, spreading. Blue grass 4 to 6 inches high, doing well.

June 18: Tall fescue 8 inches high. Tall oat grass 8 inches high. Timothy 6 inches high. Smooth brome grass 10 inches high. Blue grass 6 inches high.

July 2: Tall fescue 24 inches high. Tall oat grass 24 inches high. Timothy 10 inches high, unthrifty. Smooth brome grass 18 inches high. Blue grass seed stalks 24 inches high.

Jnly 20: Tall fescue 30 to 36 inches high. Tall oat grass 30 inches high. Timothy eaten down by cattle. Smooth brome grass eaten down by cattle. Blue grass 6 to 12 inches high.

August 1: Tall fescue 36 inches high, in bloom. Tall oat grass 40 inches high, in bloom. Blue grass seed stalks 36 inches high, in bloom.

August 15: Tall fescue 40 inches high. Tall oat grass 40 inches high, lodging. Blue grass 36 inches high. Smooth brome grass, which has hitherto been one of our most thrifty grasses, did very poorly this season, owing doubtless to the abnormally wet season.

GRASSES SEEDED 1905.

June 1: Native bluetop 9 inches high, vigorous. Native bunch grass 4 inches high, doing well. Timothy 6 inches high. Perennial rye grass winterkilled. Tall fescue just beginning to grow. Orchard grass just beginning to grow: partly winterkilled.

June 18: Bluetop 20 to 24 inches high, heavy stand. Bunch grass 12 inches high, heavy stand. Timothy 12 inches high, heavy stand. Tall fescue 5 inches high. Orchard grass 5 inches high.

July 2: Bluetop 24 to 30 inches high, very heavy, vigorous growth. Bunch grass 18 inches high, thrifty. Timothy 24 inches high, beginning to head. Tall fescue 6 inches high. Orchard grass 6 inches high, sickly growth.

July 20: Bluetop 36 to 48 inches high. Bunch grass 24 inches high. Timothy 24 to 36 inches high. Tall fescue 18 inches high. Orchard grass partly eaten by cattle.

August 1: Bluetop 36 to 58 inches high. Bunch grass 30 inches high. Timothy 24 to 50 inches high. Tall fescue seed stalks 36 inches high. Orchard grass 6 inches high, but few seed stalks, yellow.

August 15: Bluetop 48 to 60 inches high. Bunch grass 30 inches high. Timothy 40 to 60 inches high. Tall fescue 36 inches high, very thin. Orchard grass 6 inches high.

Seed was gathered from both bluetop and timothy. The bunch grass also matured seed, but as it is valuable only for grazing, no seed was preserved. The three grasses maturing seed were sown on soil well fertilized with barnyard manure. Timothy, which has not done well here when sown on unfertilized ground, showed splendid results when fertilized as above. Timothy growing as rank as this would, in the writer's estimation, yield about 3 tons to the acre. The native bluetop also gave promise of being a heavy producer of forage.

GRASSES SEEDED 1906.

Smooth brome grass, tall oat grass, redtop, meadow fescue, timothy, Japan clover, canary reed grass, and alfalfa were sown this season. The stand in each case was very poor and all made a poor growth throughout the summer,

regardless of a favorable season. This indicates poor seed. The brome grass and the oat grass made a better growth than the other grasses.

A small plat of ground was seeded to rape on May 28. This ground was unfertilized and the growth was very slow. It was sown too quickly, but when thinned out properly the growth was not much better.

A plat of well fertilized ground was seeded to 1,000-headed kale. The plants grew to a height of 2 feet, with broad succulent leaves, much relished by cattle. This plant seems to be valuable as a soiling crop.

HORTICULTURE.

The native currants set out last year made a good growth, but did not bloom or bear fruit. The currant, raspberry, and sweet briar plants received from the Sitka Station, and set out last year, did about the same. Native raspberries under cultivation for several years bore a light crop of fruit of good quality for the first time this season.

Potatoes: Four varieties of potatoes were planted from Sitka seed, viz, Garfield, Extra Early Ohio, Freeman, and Burbank. The Extra Early Ohio proved to be the best potato not only in yield, but also in size, conformation, and quality. The seed from this variety seemed to be more nearly matured than any of the others. Freeman ranked second, the Burbank third, and the Garfield fourth.

A small quantity of Extra Early Ohio and Garfield were planted in raised beds and fertilized liberally with wood ashes. These beds produced larger potatoes and of better quality than those planted in level ground and fertilized with stable manure. The potatoes were planted May 21 and dug September 20.

Peas: Alaska planted May 22 were large enough to eat August 25. Yield only fair.

Lettuce: Big Boston, Hanson, and Golden Stonehead were sown in the hotbed April 26 and not transplanted. All varieties produced immensely. This plant may be repeatedly cropped and will continue to send up a liberal supply of crisp, tender leaves throughout the season.

Celery: Seeded in hotbed April 26 and not transplanted. It was blanched by placing boards along each side and throwing earth against the same to hold them in place. The celery blanched nicely and was of good size and quality.

Parsley: Champion Moss Curled, planted in hotbed April 26 and not transplanted, made a splendid growth, over 15 inches high.

Edmonds Blood Turnip beet and Long Orange carrot, sown in open ground May 28, were very slow in coming up and grew very slowly after coming up. The carrots were almost a total failure, while the largest of the beets measured but 2 inches in diameter. Ostrich Plume mustard and corn salad planted the same time as the beets and carrots did very well, both making a good growth.

Cabbage: Early Flat Dutch and Early Jersey Wakefield were sown in the hotbed April 26 and transplanted to the open ground May 29. Of 100 heads set out but 70 grew. They grew very slowly at first, but as the rains became more frequent made a rapid growth and were heading nicely by August 26, when the greater portion of them were consumed by cattle breaking into the garden. The remaining plants produced solid heads of good quality.

Brussels sprouts: Sown in hotbed April 26 and transplanted to open ground May 29; grew well, but did not develop sprouts.

Broccoli: Planted in hotbed April 26 and transplanted to open ground May 29; grew well and formed a good percentage of heads. The heads were purple in color and not large in size.

Onion: Large Yellow Danvers, sown in hotbed April 26 and not transplanted, produced bulbs 1 inch in diameter.

FIG. 1.—PART OF STATION HERD, KENAI STATION.

FIG. 2.—GALLOWAY COWS, KENAI STATION.

FIG. 1.—COMMON STEERS, KENAI STATION.

FIG. 2.—A SO-CALLED NATIVE COW, KENAI STATION.

Rhubarb: This vegetable has invariably done well since it was started. Keeping the seed stalks cut down allows the plant to keep growing and keeps the stems crisp and tender until frost. The plants at this station are grown in raised beds.

EXPERIMENTS IN SOIL INOCULATION.

This station last spring received soil-bacteria cultures from the Bureau of Plant Industry. These cultures were for use on the garden bean and pea and red clover. We have no red clover at present, so the red-clover culture was used on alsike. The peas had been planted and some beans were planted purposely for this experiment. The directions were carried out to the minutest detail in preparing solutions of the cultures and the characteristic cloudy appearance was obtained in each instance.

In the case of alsike neither the seed nor the soil could be inoculated very conveniently, so the culture was sprayed on. Nodules were already present on the roots of the alsike, but their growth was not aided in the least by the soil culture.

A small plat was sown to beans inoculated with the bacteria culture alongside a similar plat sown to beans uninoculated. No nodules developed nor was there any noticeable difference in the growth of the plants.

In the case of pea the soil was inoculated according to directions. No nodules developed and no difference could be detected in the growth or yield.

LIVE STOCK.

Since the last report a good team of horses has been procured to take the place of the yoke of oxen heretofore used. The short growing season and wet harvest time require that a great deal of work be done in as short a time as possible. The horses are an invaluable aid.

Last spring a shipment of Galloway cattle was received, consisting of five cows, a bull, and a calf. (Pl. VII, figs. 1 and 2.) These cattle arrived May 13, after a long journey of two months. The cows were milked regularly throughout the entire trip, but were practically dry when landed. With the exception of one cow that was totally dry, the milking was continued, to keep up the milk flow as long as possible. The calf was allowed to run with its mother until late in July, when it was weaned and the cow milked. These cattle have taken kindly to the place and have done well on summer pasture.

Ten head of cattle were wintered and a record kept of feed consumed for a period of ten weeks. For a time during the forepart of the winter the feed was taken from a stack outside; and as it was frequently wet with rain and snow, weighing was impracticable.

Three cows were in milk during all or part of the period of weighing the feed, and their records show that the cow giving the most and richest milk ate the least.

Three calves were dropped during the winter, one of which died a few days after birth. The others were fed on skim milk and what oat hay they would eat and weaned at 4 months of age. Their horns were successfully suppressed by an application of concentrated lye when 4 or 5 days old.

Six steers and a cow and calf have been sold to make room for the pure-bred stock. (Pl. VIII, fig. 1.)

DAIRY WORK.

A fairly complete dairy outfit was received last fall, consisting of a small vat and cheese press, a churn, a butter worker, a milk tester, and a supply of sulphuric acid and other accessories. The separator arrived last spring. It

is a small hand-power tubular machine. Under favorable conditions it does very good work, skimming as close as 0.02 of 1 per cent.

The churn is of barrel shape, of 15 gallons capacity. The butter worker consists of a sloping triangular bed, at the apex (lower end) of which a long lever is attached which reaches across the whole length of the bed and is operated by hand. The outfit is of sufficient capacity for the work required of it here, and some excellent butter was made during the summer. A party of hunters purchased a supply late in July, and at the end of a six weeks' hunt reported the butter which remained to be in excellent condition. This speaks well for its keeping qualities.

The cheese making was not attended with such unqualified success, although some very good cheese was made. There is no dairy building; consequently the work must be carried on in the house. It is impossible to cure cheese perfectly in a dwelling house, especially during the summer. It was noted that cheese made early in the spring was of better flavor than that made during the summer. There is no doubt that the best of cheese can be made provided suitable quarters are provided in which to carry on the work. It is a significant fact that never under any circumstances does the milk develop undesirable flavors. Good milk is the foundation of all good dairy products.

The milk tester is a 12-bottle hand-power machine. The milk from each of the cows was tested once a week and a record kept of same.

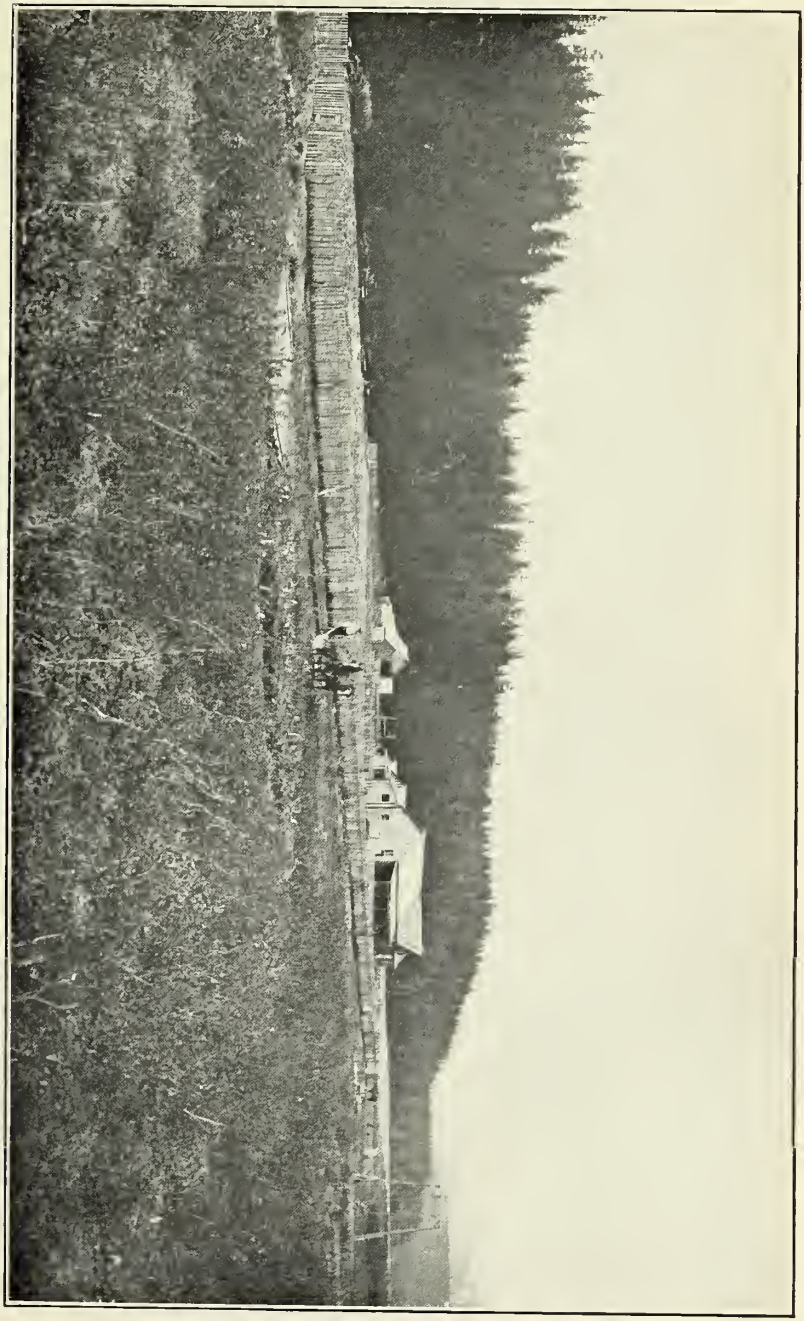
REPORT FROM MR. J. D. JOHNSTON.

Mr. J. D. Johnston, of Bear Lake, near Seward, Alaska, has sent an interesting report, which is submitted herewith. Mr. Johnston is a bona fide farmer and is making a success of his business. He took up a homestead a few miles from Seward two years ago and is now comfortably settled. He will soon have 60 acres under plow and in pasture, and his experiments with grasses will be of value to all farmers in that region. He has kindly sent views of his place, one giving a general view of the ranch. (Pl. IX.)

BEAR LAKE, SEWARD, ALASKA, *October 30, 1906.*

DEAR SIR: It gives me much pleasure to give my first annual report. I have been on my place now two years, but the first year I was employed by the Alaska Central Railroad and did no farming; only built a house and barn. Last spring I came home and have been on my farm all summer, and am much pleased with the results of my labor. My place is glacier wash, with only small brush of alder and willow. My two sons and I have slashed over about 60 acres. Have 11 acres under plow. Last June we burned about 30 acres of old logged-off land and seeded it down to timothy, which now stands 6 inches high and is as green as in the summer. This shows that tame grass, timothy or clover, will give at least six weeks more pasture than native grass, as native grass was yellow here in the middle of September. I grew a garden from the seed you sent me, also from seed I got from Seattle. My radishes, lettuce, carrots, beets, rhubarb, and potatoes were very good. Would average fairly well with such as I have grown on Puget Sound. I planted three kinds of peas—Earliest of All, Little Gem, and Alaska. Alaska I received from you and they gave the best results. My cabbage was a failure. They were nice plants when I set them out about May 20, but they did not grow well. Grew slowly; just commenced to make head this fall. I plowed one-half acre and sowed turnips broadcast about June 15, but they did noth-

J. D. JOHNSTON'S FARM NEAR SEWARD.



J. D. JOHNSTON'S FARM NEAR SEWARD.

FIG. 1.—NATURAL MEADOW ON KNUDSON'S FARM, JUNEAU BAR.

FIG. 2.—FARM BUILDINGS ON KNUDSON'S FARM, JUNEAU BAR.

ing. Clover that I planted in the fall of 1905 I have cut twice this summer, which shows that I can cut two crops of clover here for silage.

Last spring I received a bill of trees and shrubbery from Bellingham. I planted them as soon as the snow went off. I will give you results: One hundred plants each of strawberries, currants, Logan blackberries, raspberries, gooseberries, common blackberries, also three Evergreen blackberries. Every one of the strawberry plants grew lovely, just as well as on Puget Sound. Some bloomed in July and bore a few berries. My vines are as large and healthy as you will see anywhere. Next to the strawberries were the Logan blackberries. They are fine, grew about 3 feet of wood, and are dark green and healthy. Next comes the currants. They did fairly well; made about 18 inches of wood. Gooseberries did well. Raspberries which grew did finely, but only about forty out of one hundred lived; but I have some that sent up new canes 4 feet high. My Evergreen blackberry did finely; all three roots lived and grew just as nicely as in Washington. I also got Early Transparent apple trees and Siberian crab apple, and both grew about 3 feet of wood.

My family and I are great lovers of roses; so I included in my bill twenty-five rose bushes, twenty-three of which grew and are as nice as can be. Some bloomed this summer. Lilac bushes also grew well. I got honeysuckle and English ivy. The honeysuckle died, but the English ivy grew well.

I must speak of our chickens. Last winter, in February, I sent an order to Seattle for 4 dozen Plymouth Rock pullets. In due time they came, and a nice bunch they were. In a few days they commenced to lay eggs, and they have laid all summer. Some set; so we have raised 168 young ones and sold $20 worth per month of eggs in Seward. If all goes well till February 1, each hen will clear above her feed $4. That is good enough. I have kept cows for the last two years. I keep the Durham breed. They do well here for being kept on wild grass. I will expect better returns from them next summer, when I can pasture them on timothy.

Yours, truly,

J. D. Johnston.

REPORTS FROM THE SEED DISTRIBUTION.

Fred Patching, Loring, November 7, 1906.—The season was not a very favorable one for vegetables, being too damp and cool, but our garden did fairly well. (Pl. V, fig. 2.) Cabbage, as usual, made a good growth, but not as good as last year. Early Jersey Wakefield was headed and ready to use July 14; heads were of fair size and solid. All Seasons was a little later and made fine, solid heads, some of which weighed 15 to 18 pounds. Marblehead, Mammoth Drum Head, about one-third headed, but the heads were not as solid as All Seasons. Table beets did fine, making well-shaped roots of good size and fine flavor. Stock beets did not do so well, and about one-half went to seed. Carrot, Half Long Scarlet Nantes, did extremely well, making fine, large roots of excellent flavor. Danvers did fairly well. Cauliflower, Early Erfurt, did not do any good. Celery, Giant Pascal, grew very slowly and did not make a very large growth. Cutting did extremely well and grew over 2 feet high. Celeriac, Large Smooth Prague, did very well. Horse-radish grew well, but the roots were not a good shape. Leek, Monster Carentan, did splendidly, making large roots of exeellent flavor. Onion (seed), White Portugal, did very fine, some roots being over 3 inches across. Parsnips, White Dutch, probably did better than anything else in the garden this year, and many—in fact, most of them—were over 18 inches long, some being 2 feet. Radishes and lettuce did fine. Salsify did very well. Spinach grew well, was tender and of very fine flavor. Ruta-bagas, American Purple Top, made fine growth, were fine flavored, and

were not at all woody. Turnips, Extra Early White Milan, were as fine as I have ever seen, and one left till late weighed 8¾ pounds. Peas did fine, yielded well, and of fine flavor. Of flowers, roses, sweet peas, marigolds, Sweet William, violets, daisy, carnation, fuchsia, double daisy, and geraniums all did very well. I have taken a photo of some vegetables and will forward you as soon as printed. Potatoes did not do as well as last year, as the ground that raised 78 sacks last year only raised 43 sacks this year. The potato ground was not fertilized at all. All other ground was fertilized heavily with fish and stable manure.

S. F. Shepherd, Mary Island, Ketchikan, November 30.—Our garden is situated on the west side of Revillagigedo channel, at the water's edge, land sloping slightly north and east, and swept by the cold prevailing northeast winds; notwithstanding this disadvantage we have had a very fair garden. Most of the vegetables raised were from seed from the Sitka Experiment Station and sown at different times.

March 24, sowed in drills, even with the ground, peas, beets, and parsnips. Peas and parsnips did well, but about all the beets went to seed in consequence of being planted too early and in too wet ground.

Most of the garden was planted the middle of May and, with the exception of onions, did fairly well. Began to use lettuce and radishes in June; peas the middle of July; potatoes also in July. Started some very good cucumber vines, but the rain spoiled the blossoms so that only a few very small cucumbers developed.

Ruta-bagas planted early grew to weigh, on the average, 3 pounds; very sweet and excellent flavor. White turnips, small. Purple Top turnips, about 4 inches in diameter and fine grained, with delicate flavor. Carrots sown middle of May did well, averaging 3 inches in diameter. Beets sown at the same time did not grow large, none larger than 2 inches in diameter. Potatoes and all seeds sown the middle of May did the best.

During the season eight kinds of lettuce were sown; Giant Glacier and Henderson New York did the best, making fine large heads. I planted three kinds of peas. Marrowfat vines grew 9 feet high, and we fail to know how much higher they would have gone, as the bushes that supported them broke down. Early Alaska did the best, producing large, well-filled pods. Set out cabbage plants June 9 on new ground, using but little fertilizer. They grew very well, making solid heads, but mostly small, none weighing over 6 pounds. Cauliflower, on same kind of ground headed nicely. We also have a fine bed of kale. The cabbage, kale, and cauliflower plants were started in boxes set out of doors in a sheltered place.

May 24 we set out eight small fruit trees, three currant bushes, and eleven raspberry bushes. Three of the trees were Yellow Siberian crab apple, two Florence, and three Yellow Transparent apple. The crab and Florence made a growth of 18 inches. The apple did not do so well. The currant and raspberry made a good start. These fruit trees and bushes were sent from the experiment station at Sitka. Scotch broom seed planted May 1 made a growth of 2 feet. May 23, set out fifteen 1-year-old rhubarb roots; they produced plenty of fine large stalks. June 15, planted rhubarb seed, which made a growth of 12 inches. Horse-radish planted in various places, experimenting in different kinds of soil, seemed to do equally well. We have about one hundred red raspberry bushes growing, fifty set out in December, 1905, and fifty in February, 1906, all doing well, but those set out in February doing better than the others. Our strawberry plants did well, producing berries about the size of those grown in Washington and Oregon. Sunflowers planted May

30 grew 6 to 8 feet high, bloomed nicely, but rain spoiled the blossoms. Sweet Williams, carnations, pansies, mignonette, nasturtiums, and many free flowering annuals do well here. Nasturtiums, which we took pains to train, grew 12 feet high and were filled with blooms the whole season until killed by first freeze, December 4. The ground here is new, having been spaded this year for the first time. Had but little fertilizer to use on it. What we did use was ashes and seaweed and a very limited quantity of dogfish. Shall not use fish after this year, as I am told that after a few years the soil will not retain moisture owing to the fat in it.

Our neighbor, Mr. John Carlson, in the same locality, had an equally good garden.

The season has been very wet, having very little of what might be called growing weather, yet we are quite satisfied with the results of the first year.

Mont Galvin, Point Retreat Light Station, October 29.—Beets seeded in drills April 25 came up May 17. Made good-sized beets. Used last of them this month. Beans sowed same time took a month to germinate. Grew about 6 inches. Did not bloom. Broccoli seeded in open ground April 1 came up in ten days. Transplanted May 20, but did not grow scarcely until July 1; commenced to head September 1; made very large heads. Some are growing yet; look better than cauliflower and are more solid. Carrots seeded in drills May 25 came up June 5 and grew to a good size, short and stubby. Corn salad sowed on August 1 came up the 10th and is doing well. Will cover with grass later and preserve for spring. Cress sowed April 12 came up eight days later; grew the fastest of any plants I had. Pulled out July 1, as the plants commenced to get old. Asparagus seeded April 25 in rich soil, but did not germinate. I must have overheated it in water.

Siberian kale seeded in open ground April 1 and transplanted May 17 grew big and fast; did not head, but made leaves 4 feet long. Mustard seeded April 1 was in bloom June 15. Pulled out July 1. Got old and woody. Mint made a plant 2 feet in circumference. Parsley seeded April 1 did not come up until May 15. Transplanted July 1. Did well; made large leaves and is growing yet. Parsnips seeded in drills May 1 came up May 20. Did well; some were 14 inches long and from 2 to 4 inches in diameter. Ruta-bagas planted May 1 commenced to thin June 1; kept pruning the leaves all summer; grew fast and quite large. Rhubarb seeded April 20 came up May 10 and did well, making leaf stalks 16 inches long. Radishes seeded April 15; commenced to use May 20. They grew better than the other kinds of radish seeds I had.

Apple trees planted May 17 kept sprouting and made stems 8 to 14 inches.

Currants planted same date kept growing until August. For some unknown reason they commenced to decay. Made new sprouts from 4 to 7 inches long, but did not grow any after August 10. Raspberries planted same date; did fairly well, but did not seem to follow up the growth. Made stems from 4 to 6 inches long. Salmonberries planted same date; two never sprouted, while the others did well; made new stems from 5 to 8 inches. Gooseberries planted same date did not seem to catch right away. Started to sprout July 1; made stems 12 inches, while the others made from 5 to 9. They were the best of the lot to grow and are still holding out.

C. E. Peterson, Sentinel Island light station, October 16, 1906.—I received several kinds of seeds from you and seeded in the hotbeds for the first time. Results are as follows:

Cabbage, Early Jersey Wakefield, Flat Dutch, and Drumhead, sown in hotbed April 20, were transplanted May 28. October 1, out of twelve plants, I realized ten good solid cabbages, Flat Dutch doing the best. Wakefield did not do so

well; two out of four went to seed; balance very good, averaging 8 pounds, crisp and tender, the finest I ever ate. Cauliflower, Early Paris, did well. Brussels sprouts, German and French, did not do well; went to seed. Kale, Scotch and Siberian, both did well. Celery, slow, bnt very good; 10 to 18 inches high, but not bleached yet. Rhubarb, slow, but doing very well after I removed the cutworms from the roots. Broccoli all went to seed. Peas, out of your seed and the seed I had from Detroit, Mich., Thomas Laxton did the best, thongh late; American Wonder did not do so well this year; yonr peas did not pod at all, only bloomed. Beans, Valentine and Black Dwarf, did not pod; grew only 4 inches high, althongh planted on good mannred ground. Turnips, Purple-Top Strap Leaf, did not do well; spongy and small. Ruta-baga, Champion and Thorburn, Thorburn doing best, but small. Carrots, Chantenay and Scarlet Horn, Chantenay doing best; small, but good. Asparagns did not even come up; for what reason I can not tell. Parsley, cnrled and plain, both doing well. Cress and mustard doing well and up early. Parsnips not doing well this season; long roots, but no body to them.

Potatoes did well this year, some weighing 24 onnces, bnt rather watery. Fish and rock weed nsed for fertilizer; bnt as I planted them in ground that has never been turned before, I think I did exceedingly well, and, on the whole, I am well pleased with my year's resnlts.

The apple seedlings you sent me a year ago last spring I transplanted to deeper gronnd, and they are all doing well. The two Duchess, Borovinka, and the Red Astrachan died out last winter, but the balance of them, six in number, are all doing well and look healthy. The raspberries, also, I had to transplant. Out of five I saved three. Two have berries late in August. The red currants have berries, almost a teacnpfnl from one bnsh 4 feet high; very good. Any kind of berry will grow on this island.

Flowers doing well, althongh late on account of the wet season. Sunflower 46 inches high, but did not bloom. Carnations did not bloom.

Andrew Jaekson, Point Sherman Light Station, Lynn Canal, September 30.—I dnly received the vegetable seeds and nursery stock that yon kindly sent me last spring, for which please accept thanks. The vegetable seeds proved to be of good quality, as none of them failed to germinate. This has been an unusnally bad summer for Lynn Canal, so that only a few of the hardiest vegetables would grow. Potatoes, turnips, ruta-bagas, peas, radishes, and rhnbarb did fairly well.

I could not even grow good lettuce without the aid of the cold frame. I planted sweet peas in a box abont May 1 and transplanted about July 1. The sweet peas were then about 4 inches high and they are still only 4 inches high. Last year I transplanted flowers in the same place on Jnne 7 and had a nice flower garden. This year it has been a total failure, but in spite of the bad weather I could grow most all of the vegetables by nsing a cold frame. My potatoes did fairly well, as I only planted potatoes that were bought for table nse from Astoria, Oreg. They are of good quality and abont five of the best hills will fill an ordinary water pail. Potatoes that had good strong spronts when planted about May 15 did by far the best.

The following nursery stock was received in good order and set ont: Apples, 2 Florence, 3 Yellow Transparent, and 2 Siberian crab; 3 red cnrrants, 3 white cnrrants, and 5 raspberry plants. The Siberian crab has done by far the best this snmmer, making a growth of about 14 to 16 inches; then next comes the Florence with about 10 inches, and the Yellow Transparent, making only a few leaves. Two of the red currants died this summer, bnt the one left is getting along nicely. The white currants are doing very little growing, but the raspberries are doing nicely.

Gust Grundler, Douglas, October 23.—The following is a report of my experiment in gardening for this season: The cabbage maggots were worse this year than last year, destroying all the cole crops. I only had about 30 plants left out of 300. I received some circulars from the Bureau of Entomology, Washington, D. C., advising me how to treat maggots if they should appear again. As we had much rain here this season, the plants grew finely all summer and started to head; then we had a few warm days in July and all the plants started to wilt. By investigating I found that all the small roots were eaten off. I found as many as 40 maggots on one plant. Ruta-baga plants and turnips were also full, and so I thought the best remedy for them would be to pull them out and pour boiling water over them, killing all the maggots. I also used coal oil for killing maggots. As the maggots were so numerous I thought it would be too late to use any of the remedies advised in the circular. A man who is working a farm a few miles from here lost 600 plants out of 1,800. As soon as he found out he had maggots on the plants he boiled soap to the thickness of sirup and poured it down the stalks. A few days afterwards he used some linseed oil in the same manner as he did the soap. He claims he saved a great many plants. I used some sulphur again, but with no results. I had about fifteen heads of cabbage left. Early Jersey Wakefield made fine solid heads. Early York the same.

Kale, Dwarf Green Curled Scotch, did finely; also Siberian kale, but the latter grows too low on the ground. Cauliflower, Extra Early Snowball, got a few fine heads. Broccoli, most of the plants sent up seed stalks before the maggots attacked them, and what was left made small heads. Brussels sprouts, only four plants left, but they did finely. It made enough for a meal. Carrots, Golden Rod, were fair. With beets I had no success. Plants transplanted from hotbed sent up seed stalks. Sown in open ground in June did not get large enough to be any good. Onions do not grow here from seed. Beans, Lazy Wife, grew about 2 feet, but did not bloom. Peas, Alaska and Maule Extra Early, were both fine, giving a good return. Celery, White Plume, plants grew very slowly, did not get large enough for table use. Of rhubarb, Victoria, I got about fifty plants out of one package of seed. I transplanted them and they grew very well. Old plants did very well. I had six cuttings from them. Asparagus, Conover Colossal, I am experimenting with. I have some good-looking plants, but next spring will tell what they are worth. Lettuce, California Cream Butter and Salamander did well. Maule Immensity grew very large, but was tough. Radish, The Leafless and Early Scarlet Turnip, did well in the early part of the spring. I can not raise any during the summer on account of the maggots. Peppergrass grew very well, but is little used.

Strawberry plants I had from Seattle were very badly injured by frost, but they recovered better than I expected, and I had some fine berries. I also had some plants growing which I got from a garden here. They stood the frost better and grew into big bushes, but as they did not bloom for two years I pulled them up. I have seen the same in other gardens, and I wish somebody would tell me the cause of it.

The apple trees set out last year grew well—12 to 24 inches. The plum trees are making fine trees also, and I expect them in bloom next spring. Cherry trees did not grow at all. I transplanted them and I found that they had not a single new root grown in two years, but they are still green and had some leaves.

The apple trees you sent me this spring are all growing except one Yellow Transparent. The others and Siberian crab apple grew from 8 to 12 inches.

Florence crab apple grew 24 inches. Currants and gooseberries planted last year grew well, but did not bloom. Raspberries had a few berries on. All the berry bushes planted last spring are doing well.

Potatoes, Early Rose, grew very well. I had some fine potatoes. I also planted some Freeman Early, but they did not do well. I think they grow better in a dry climate.

J. C. Burgess, Chilkoot Cannery, Haines P. O., October 2.—The crab apple, currant, and raspberry bushes sent me last spring were duly set out and have made a phenomenal growth, considering everything. First they were kept about a week at the Columbia Cannery store near a stove until the buds were bleached white. All lived except one or two. Then I planted peas near them, as I thought, of the dwarf variety, and of course they somewhat smothered the bushes; however, I think it caused them to take root better on account of the peas.

The vegetable seed all came up finely and all did well, except broccoli, which grew finely, but did not form any heads. Beets inclined to want to go to seed. Kale did finely. Brussels sprouts just having nice sized heads coming. Cucumbers were planted in barrels sawed in half and filled with rich soil and manure, I think I made a mistake in not boring holes in the bottom of the barrels for drainage. But the season was too cold and rainy. They were a failure. Turnips are wormy. Ruta-baga was fine, also parsnips, carrots, rhubarb, peas, celery, lettuce, and radishes.

I had about 1½ tons of fine potatoes, Early Rose and a large white potato.

B. F. Hefele, Skagway, July 1.—The trees which I got last year are all dead in spite of my taking the best of care of them. Three apple trees are alive—one Yellow Transparent, one Borovinka, and one seedling. They were pretty weak when I got them and have been so all the time. The raspberry and the currant bushes came finely, and wintered without any trouble, in spite of it being a very cold winter. I lost only two currant and one raspberry bush. The latter seems to be the hardiest of them all. All the trees which I got this year are doing well. There are seven apple trees, whereof the Yellow Siberian stands first. The three white and four red currants are coming on finely and the spear of mint is doing well. Last year's raspberries are bearing already and have good healthy shoots for next year, the assurance of plenty of berries.

The vegetable seeds planted, lettuce, peas, beans, turnips, radishes, and beets, are doing fairly well, considering the poor weather we are having this year. Until now we have had very few warm days.

George Blanchard, Skagway, October 22.—Vegetable seeds just received, and thank you for same. The apple trees, currant, and raspberry bushes received from you this spring have done very well. The raspberries have grown large and had some fruit. The currant bushes also grew well, but had no fruit. The apple trees, with the exception of one, have done splendidly, and this winter will tell how they will be able to stand the cold. Am going to manure them and cover them up and hope they will pull through.

F. H. Partridge, Hoonah, October 29.—I received a fine assortment of vegetable seeds last spring, and another assortment for next year arrived in the last mail. Thank you very much for them. Your assortment of currant, raspberry bushes, and apple trees arrived in first-class condition, and I planted them in gravel that has a large percentage of black mold. I placed seaweed and fish guano under them, but the flies got in their work with the guano, and the maggots completely destroyed the raspberry bushes and two of the currant bushes. The apple trees survived, but did not grow any; neither did the remaining currants. I found that guano used on any crop will attract the flies, and unless it

is placed deep and thoroughly mixed with the soil it will damage and sometimes ruin the tender roots of the plant. I think, to be successful, guano should be used in the fall, and then it will be more readily assimilated by the plants next year. There is no question as to its value as a crop producer.

I excavated some slate shale from the side of a bank in the summer of 1904 and planted a few seeds on it, and nothing would grow; but this year on the same plat of ground I used guano, and the result is marvelous. Lettuce, radish, mustard, Purple Top Strap-leaved turnip, and Cow-horn turnip grew rank, and of the most delicious flavor of any that I ever tasted.

Flowers, too, were something wonderful. My collection was nasturtium, sweet alyssum, mignonette, California poppy, morning glory, and sweet pea. The latter grew rank, but owing to there being no sunshine there was no bloom.

Plat No. 2 contained Savoy and Early Jersey Wakefield cabbage and Alaska peas. They all did remarkably well, considering the soil was nothing but beach gravel with guano as a fertilizer. I am satisfied the Alaska pea is all right for this climate, as there were peas large enough to eat by the last of August.

Plat No. 3 was planted to parsnip, carrots, beets, Purple Top turnip, rutabaga, and Brussels sprouts; also a few onion sets. The soil was a dark loam with a silt mixture; fertilizer, guano. Results, considering the cool, wet weather, were truly surprising. The seed was planted just before the dry spell in the spring. They sprouted all right, but being so near the surface, about two-thirds of them failed to take root, but those that survived grew very rank. I harvested more vegetables than I can possibly use this winter, even after selling over one-half of them. About 90 per cent of the cabbage formed nice, solid heads.

My experiments have taught me the value of seaweed and fish guano as a fertilizer, and I believe that farming in Alaska can be made a paying proposition if one farms the same as they do in the States—with a team. Selection of soil is a factor that is to be considered of great importance. I prefer soil at the mouth of some stream or creek, where there is a wash dirt or silt, as vegetables seem to do better.

C. F. Stites, Sundum, December 10.—I write to let you know that we can raise potatoes here as well as in Skagway. I have the Gold Coin. I had almost given up until I got them. For some years I did not get my seed back of other kinds. Last year I had all Gold Coin but one sack.

I had in cultivation 28,000 square feet, about one-half of which was new ground, which I could not do much with, as it was heavy sod, so I just turned it over. Every third row I put seaweed, and seed about 1 foot apart. I could not hoe it much, for sod was too tough; but I got 110 sacks of large potatoes and 10 sacks of small ones. The largest potatoes weighed 1½ pounds, and the product of one hill weighed 8 pounds.

From about 1,000 square feet of old ground I dug 7 sacks September 1. The first were big enough to eat July 15, and I took five sacks to Juneau August 1.

The apple trees you sent me two years ago made about 18 inches growth last summer. Most of the berry bushes have died.

Ole Martin, Seward, October 29.—Rhubarb, Victoria, planted in boxes May 1 and transplanted June 10 was large enough to eat August 15. Kale planted May 1 and transplanted later; had kale all summer. Mustard, Ostrich Plume, did fine. Brussels sprouts, trench grown, did fairly well. Cabbage, Early Jersey Wakefield, about 25 per cent of them did fine. Parsley, Champion Moss Curled, grew about 8 inches high. Parsnips, Hollow Crown, a fair crop. Turnips, Purple Top White Globe, the largest weighed 3 pounds; average, 1½ to 3

pounds. Peas, Alaska, large enough to use the middle of August. Carrots, Scarlet Horn, as good a crop as could be grown. Beets, Edmonds Blood, about 4 or 5 inches in circumference; fairly good. Ruta-baga, Purple Top American, average, 1½ to 2 pounds. The porcupines have been very troublesome. They eat everything that comes in their way.

Potatoes, Early Rose, out of 350 pounds got 600 pounds. Turnips, raised 20 sacks. Ruta-baga, 18 sacks.

Red raspberries made a growth of 1½ feet. The white currants and apple trees made a good growth. The apple trees from 1905 are doing finely. The porcupines destroyed two of them. Will fence them out this winter.

Flowers—had the finest display you would wish to see in Alaska. Mint also is doing fine.

Clover and timothy grew 3½ feet tall. Oats, a little plat 30 by 40 feet, was cut October 10 for green feed, as it did not ripen; also a little barley planted May 28 did not ripen.

Can not say much about the rest of my seeds, as my garden is new. Have about 2 acres under cultivation. Have a dwelling house 12 by 22 feet, cellar 12 by 20 feet, double walled; also a wood shed and tool house.

Curtis P. Coe, Wood Island, Kodiak, October 30.—In response to your request I submit the following report of agricultural work at the Kodiak Baptist Orphanage for the past spring and summer:

The spring opened early. The frost was out of the ground in sandy places in early March, and on March 16 we plowed one of our gardens, and the next day planted kale, onions, peas, lettuce, endive, carrots, and parsley. From none of this planting did we receive returns worthy of mention.

On March 29 we planted a sandy field which we have been experimenting with for several years, trying to find something that will grow. This time we tried vetch, peas (Canada field), alfalfa, mammoth clover, red clover, oats, and spurry. Each of these kinds of seeds, except the last two, had been treated with the nitrogen culture adapted to it and sent by the Government. The results were not at all satisfactory, as the yield was next to nothing. However, this field has not been productive in the past, except in very rare cases. There was evidence of a slight improvement over legumes tried formerly. Many tests of the cultures indicate a little value in their use.

The same kinds of seeds were tried in different soil, sowing them the same day. The oats and vetch did much better and were cut for hay in September.

April 28 potatoes were planted on ground plowed March 16 and which two weeks before planting had received a liberal amount of potato fertilizer purchased in Seattle of a reliable firm. The seed was partly imported for planting. The yield was not more than three times the seed planted. On this same land a few years ago we raised potatoes that yielded at least at the rate of 200 bushels to the acre. Potatoes were tried at three other places, the fertilizer being used in each case, but the results were no better. Others in the vicinity have had better success than usual this year with potatoes.

The only vegetables which have made much of a return for seed and labor have been carrots, lettuce, salsify, and radishes. All others have failed. Cabbage and cauliflower failed because the cattle broke down the fence when they were just making heads and feasted upon them.

One cause of the failure, I believe, was the cold rainy weather in July and August, making it almost impossible for vegetables to make a satisfactory development.

Our cattle have done very well. Six cows calved in the spring, and all have done well all through the summer. The yield of milk has not been so large as formerly, but has been satisfactory, as they have averaged considerably more

than 3,000 pounds of milk each in the last six months. We have eighteen head all told.

Our goats have not done so well. A year ago last summer two old ewes were lost, and in the fall two young ewes were also lost; then this last spring two kids, also ewes, failed to pull through the first few days. The loss of the old and young ewes was, I think, by the tide catching them on the beach at some place where they were unable to climb the cliffs. We now have three ewes and two bucks.

A year ago I sent to Washington and purchased a pair of thoroughbred Berkshire pigs. They have grown well and have been well and hearty. They have cost little for feed. At 1 year of age, August 3, the sow had a brood of eight, seven of which lived and are now fine shoats. The original boar at 18 months will dress over 300 pounds, and the sow would dress over 200 pounds. I have sent for another young male that there may be no necessity for in-breeding.

Chickens have done very well, at least in raising the young. The eggs hatched very poorly, but I find others had similar trouble. Of about 150 hatched, mostly by incubator, we raised 130 in homemade brooders. Some are Black Langshans, others Barred Rocks, and the rest are just chickens. The egg production has been rather below the average, but we ought to have plenty of eggs this winter and next spring, as all old hens have been disposed of and the flock now is young, hearty, and thrifty.

We started the year with 3 Pekin ducks, but after eating quite a number and selling others we have a fine flock of 20. In ten weeks the young ones were as large as the parent birds. They make a very rapid growth and are most excellent eating. I have wanted to try geese, but one purchase of native birds proved to be all ganders. The kind I have wanted—the Gray African—is hard to procure in the West. A fancier in Washington quotes them at $25 per trio. I will have to get along without them at that price.

The Galloway cattle which were received May 1 have grown rapidly and have increased in weight at least 50 per cent, and I think more. The bull at 2 years of age was about the size of a native bull killed recently which dressed 650 pounds. The Galloways are gentle and kind.

Experience has proven again that the silo is a necessity to anyone who wishes to raise cattle in this part of the country. The weather during haying time was very wet, and hay has been hard to make this summer. The silo, however, can be filled at all times. Mr. Rier, superintendent of Frye-Bruhn's ranch, informs me that he can put up ensilage for less than $1 a ton. He has several silos near the beaches which produce the beach grass. We have to boat our grass 6 or 8 miles, but find it a cheaper food than hay. A silo for storing at the beach is contemplated, as we have much fine weather in the fall after the grass is too tough to be good.

Most of the small fruit and fruit trees sent out by you have lived and grown. The raspberries have made the best showing; the canes are 6 feet high, and this summer they bore a handful of fruit.

Alex, Friedelin, Afognak, October 7.—Arriving home from beach mining on May 24, although late, I commenced to work on my gardens the next day and continued until I had all seeds sown and planted in the ground, and finished on June 12.

Cucumber is one of the very important articles of food amongst people of northern Europe. It is put up for winter use in big barrels, is salted down together with black currant leaves and dill, and would be a desirable article to have in Alaska for winter use.

I have been trying to raise cucumbers for many years, but without success. Last year I made a bed of thickly packed kelp covered with earth, the same as they do in Siberia, but using manure instead of kelp; planted seeds (Arlington White Spine) on June 3. They came up fine and started to grow vigorously; but after a while the leaves commenced to turn yellow and plants wilting; eventually they all died. The same thing happens with them every year. I was blaming the climate for the trouble, but now I am convinced that the climate is not to be blamed altogether, but worms in the ground, which attack the tender plants, are contributing toward failure.

With vegetables I had but a partial success, on account of lateness of planting; however, I dug up and gathered 23 sacks of pretty fair potatoes.

Flowers commenced to bloom about six weeks ago and are blooming still.

The apple trees you sent me in the spring are doing nicely; also one apple (Tetofsky) and three seedlings from last year's planting.

With few exceptions the currant bushes started to grow, but none of the raspberries took root. However, there are three raspberry bushes from last year's planting, and one had a flower but failed to mature into fruit.

During the summer I noticed that my apple trees lost their vigor and did not grow as they should. Upon inspection I found yellow spots on the leaves, caused by a small green jumping insect, hardly visible to the eye. Not knowing any other remedy for such unwelcome guests, I just sharply tapped with my finger upon the branches, shaking them off very easily from under the leaves, doing so whenever opportunity allowed. The growth improved and they are now vigorous with green leaves.

It would be of great benefit to Alaska if the propagation of common trees which have an economical value were started, say the pine.

George Roll, Hope City (Cook Inlet), June 8.—It gives me great gratification to inform you that the fruit trees, raspberry and currant bushes sent by you in the spring of 1905 made a fairly good growth. The raspberry and currants did very well. The fruit trees have maintained themselves well during the winter, without any protection whatever. The past winter has been the coldest winter we have had for ten years. The trees were covered well with snow all winter, which is not the case every winter. The mice did a great deal of damage by gnawing the bark from the fruit trees. Next winter I intend to prevent this feast by tying tarred paper around the trees.

George Roll, Hope City (Cook Inlet), October 1.—I herewith transmit the following report:

Apple trees: Martha, doing well; new growth during the season 26 inches. Duchess, doing extra well; very dark-green leaves; growth only 20 inches. Yellow Siberian crab, good healthy leaves; making only 14 inches growth.

Raspberries: Thrifty looking; new growth for the season 54 inches. Leaves all green and have ripe and green berries at this date; first berries ripened about August 10. Size of berries $2\frac{5}{8}$ inches long. Plants two summers old.

Currants: Bushes look vigorous; have grown 30 inches during the season; two summers old; no fruit. Native do not do well in the gardens; in blossom too early and nearly all blossoms get killed by early spring frosts. Four-year-old bushes larger than the native and about two weeks later than the native. One 4-year-old bush yielded 16 pounds of fruit.

Gooseberries: Four to five years old; new growth 5 to 10 inches. Five bushes gave 12 quarts of fruit. Leaves coloring at this date. New growth gets winterkilled from 4 to 5 inches. Fruit commenced ripening about September 15.

Strawberries: Native (Alaska) fruit ripening about August 20. New plants from 4 to 6 feet long.

Vegetables: A fairly good season, although very little sunshine from June 25 until September 11, with very little rain. Frost came about September 1.

Beans: Early Challenge, planted May 22 and 26, gave a very small crop. Were ready, or rather had to be picked on account of the cold, frosty nights, on and after September 24. Two hundred feet yielded only 1½ quarts of half-grown pods.

Beets: Early Egyptian, planted May 22 and 26, produced roots from 3½ to 4 inches in diameter, very few going to seed.

Cabbage: Early York, transplanted May 28 till June 10. About 200 plants were set out, but the first week in July the maggots began feeding on the roots and killed about 50 per cent of them. The balance produced heads from 2 to 6 pounds. Good for table use about September 20.

Cauliflower: Early Snowball, most all killed by maggots; few produced small heads.

Celery: White Plume, transplanted July 6, and October 1, 12 to 16 inches high, growing yet and nearly all blanched.

Carrots: Ox Heart, planted May 22 and 26; October 1, very large roots.

Potatoes: Early Ohio, Early Freeman, Early Rose, Colorado. Early Rose are little better than Freeman. Early Ohio is not as heavy a yielder as the Early Rose or Freeman, but has good-sized oblong potatoes and small tops. Colorado did not yield very much. Planted May 18 to June 4. Total yield, 1,735 pounds. I had a very good crop, although the yield of 1905 was about 100 per cent better.

Ruta-baga: Purple Top, transplanted May 28. Weight from 5 to 12 pounds each. Sown from seed June 16, weight from 2 to 4 pounds each.

Turnips: Purple Top, sown May 22. Seed bought in Seattle did not germinate, as without doubt the seed was very old. Sown again, my own home-grown seed, 4 years old. Did germinate very good. A 100-foot drill produced about 195 pounds good-sized turnips, although most all of them were maggot eaten.

Parsnips, sown May 20 to 26, yielded roots of fairly good size.

H. S. Tibbey, Coal Harbor, Unga Island, July 1.—Referring to the grafts and seedlings sent last spring, I take pleasure in reporting that they were planted in the open in a spot somewhat sheltered from the cold northwest winds. With but few exceptions they throve well during the summer and fall. Of the seedlings but one survived the winter; of the apple grafts four came through the inclement winter in good shape and are strong and sturdy.

The red currants (2) and raspberries did best of all and have already made 8, 12, and 14 inches of growth so far this spring, and indications point at least to flowers, if not berries, during the summer.

The experiments made in cultivating the wild strawberry have met with entire success. To-day they compare favorably with the cultivated domestic berry.

John W. Dobbins, Nushagak, March 1.—Your letter of September 20, 1905, reached me this morning 60 miles from Nushagak, five months and ten days on the way from Sitka. No wonder experimenting in agriculture is slow. Again, as to Nome, after four years of hard work and expense in preparing garden land, houses, and plant beds, and fencing, I could scarcely get a recognition from anyone. Not being satisfied with such results, I gave a lease of my possessions on patented land to another party to still continue the experiments at Nome until I could find a suitable location in which I might be able to advance. I went to Seattle, and from there to Nushagak. I arrived at Nushagak May 30, 1905, rather late in the season to prepare and plant many varieties of anything except common garden truck. I brought with me from Seattle 1,000 strawberry plants. I planted them about June 15, and, wonderful to relate, they made a good growth, both in stem and root; the runners bore fine young, healthy plants for this year's planting. The original plants did not bear fruit. I am located 30 miles from Nushagak, northwest up Wood River. The most of my seed

potatoes, two bags of Early Rose and two bags of Burbank, did well, especially the Early Rose.

Flat Dutch cabbage made excellent growth for late planting, but did not head. Early York did better. Flat Strap Leaf turnip grew to good size.

Many varieties of radishes and lettuce grew rapidly and will be profitable for table use. Onion sets made fine onions. (A bear on Sunday night destroyed a bed 10 feet square.) Onion seeds did not thrive. Peas were not a success. Carrots and parsnips did well. This is the extent of vegetable gardening this year. The land is good, but requires cultivating. I have a fine piece of land prepared for this year's planting.

I brought from Seattle twelve varieties of rose bushes; all are doing well, and a dozen other pot plants are all thriving.

Rev. J. H. Schoechert, Quinhagak, Kuskokwim River, January 24.—The seeds you kindly sent last year and the offer of free distribution of raspberry plants were received in due time, for all of which we desire to thank you most sincerely. Being so near to Bering Sea, where no trees grow, we fear it would be useless and unnecessary expense to make the attempt with raspberry plants and fruit trees.

Turnips, radishes, lettuce, and cress were those we had the most success with the past summer. Radish (French Breakfast), Curled parsley, Curled cress, and Improved White celery were sown from April 1 to 15 in the hothouse and did well, but those which were sown in the middle and latter part of May in the garden did poorly, the summer being too cool and wet.

Early Jersey Wakefield cabbage and cauliflower, which were first sown in boxes the latter part of March and later transplanted in tin cans, one plant in a can, and at the beginning of June placed in the garden, did fairly well.

Onions we tried the past few years, but have had poor success so far, even in the hothouse. We must also report the same of carrots, beets, peas, and mustard, but then, as mentioned before, the season was wet and cold; besides, along the coast here it seldom gets very warm.

With the flowers Mrs. Schoechert had better results. She sowed them in March and transplanted them in the hothouse in May. Stocks were very nice and fragrant. Dwarf nasturtium, sweet peas, mignonette, pansy, and phlox drummondii were real beauties and the delight of everyone. They were kept in the house and the hothouse.

Rev. Peter Orloff, St. Michael, March 5.—I have the honor to report the following as to my progress in garden products at St. Michael, Alaska, for the year 1905, from seeds received from your Department:

Planted a garden of 300 square feet with the following vegetables: Lettuce, turnips, ruta-bagas, beets, parsley, and potatoes, with the following results: Lettuce, ruta-bagas, and turnips produced good crops; beets and potatoes were small; parsley and cauliflower did not grow.

I desire to make larger experiments in the garden products this year and give it further attention, and in order to aid in my enterprise I would respectfully ask that you send me at once a small supply of seeds suitable for this part of Alaska.

S. A. Shea, Council City, October 15.—Yours of October 2 at hand, and will here state what I grew at Council:

Early Milan Purple Top turnip; Early Globe Purple Top turnip; Golden Heart ruta-baga; Wakefield cabbage and Succession cabbage, which are ten days later than Early Wakefield; Radishes of all kinds except Chinese Giant. Beets, peas, parsnips, and carrots do well. Kale grows extra fine; spinach not so well. For manure I made compost, using stable manure, burnt earth, and fish. To make cabbage head and turn white is a secret of my own, and I do not care to

let every one know it, as it would injure me. I had better lettuce than I ever saw in the States. The suitable kinds are New York Head, Immensity, and Golden Queen. The above are the best for Council.

Potatoes will prove profitable at Council, as I have tried them the best and worst of seasons, and when they get killed by frost I find them large enough for market. I had real large ones this season, but only a few hills to try.

The island I own contains 60 acres of good soil. The water runs under the island all winter. Therefore there is no ice in the ground after June 1. There is no other place near Council fit for gardening. It would be a fine place for an experiment station. Oats will grow finely; so will wheat. Oats are ready to cut for hay by July 25. I could raise tons of vegetables there, but I could not sell them.

Rev. John W. Chapman, Anvik, October 6.—The season has been an unusually favorable one for our gardens. Potatoes are large and of fine quality. Cabbages formed fine, solid heads. Cauliflowers were better than usual. The Early Paris grew to a diameter of over a foot, but they were not so compact nor so sure as the Snowball. Egyptian beets grew to a diameter of 4 inches, and were all tender and good, few of them running to seed. The soil upon which they were grown had a good deal of lime and ashes. A head of Wakefield cabbage without the roots and large leaves weighed 6 pounds. The largest potatoes weighed 20 and 21 ounces. The potato crop was greatly benefited by the use of stable manure. A piece of ground 20 by 50 feet produced over 1,000 pounds of turnips. Mr. T. Spalding raised 2,100 pounds of potatoes on a piece of ground 50 by 70 feet. He also showed me some wheat which had reached maturity. Windsor beans attained a fair size. Valentine beans made pods of from 4 to 5½ inches in length. This is the first time that we ever saw them so forward here. Kohl-rabi was perfectly successful. Rhubarb is excellent.

Five natives raised potatoes in quantities varying from 50 to 2,000 pounds each. I hear of two gardens made by Chageluk natives this season. Interest in gardening among the natives is increasing.

Cattle have proved a good investment. The cow gave us 2,000 quarts of milk the first season, paying for her purchase and transportation and that of her calf and her own keep for a year. She freshened September 21 and is now giving 18 quarts per day on native forage alone. The stock are all in fine condition.

George H. Miller, jr., Circle City, December 6.—I received from you in the spring of 1905 some apple trees, also some raspberry and currant bushes, which grew finely, but the raspberries and currants were winterkilled. We had a very severe winter last year (1905), the thermometer registering 72° below zero for nine days. Last winter we had 4 feet of snow on the level, but so far this year only 11 inches.

One of the apple trees which I received in the spring of 1905 I took up in the fall and kept in the house during the winter in a large wooden tub. In the spring I did not take it out of the tub, but set it out of doors, where the new wood made a growth of 18 inches. It is now over 2 feet high and in fine shape. Shall put it in the ground next spring.

Received raspberry and currant bushes last spring. They grew very finely, and one feature in the raspberries I note is that the leaves retain their fine dark green color for a month after all else is dead.

The Yukon River was very low this year when it froze, lower, in fact, than for ten years.

The following data may be of interest:

Opening of the Yukon River at Circle, Alaska.

Year.	Date.	Year.	Date.
1898	May 12	1903	May 16
1899	May 19	1904	Do.
1900	May 11	1905	Do.
1901	May 22	1906	May 14
1902	May 16		

The river closed this year November 7.

Henry A. Stade, Circle, August 27.—I take pleasure in reporting to you the growth of the seeds you forwarded to me.

Beets, Edmond Blood Turnip, did well, large and prolific; carrots, Scarlet Horn, matured in good shape; peas, Alaska, did finely, abundant yield; cabbage, Early Jersey Wakefield, poor stand, otherwise good; parsnips, Hollow Crown, slow growth, did not mature; ruta-bagas, Thoburn Improved, did well; turnips, Purple Top, did well; crab apples, five of the six trees sent doing finely; currants, only one out of the lot received lived; raspberries, very sorry to report that none of them grew.

Potatoes, Burbank, those planted on old ground did well; those on new ground did not do so well. They were small and did not mature.

Wheat, barley, and oats did well and matured by August 25.

Timothy and clover (red) did well; hard to cure, owing to frequent rains.

If you can send me a few potatoes of an early variety, I shall be very glad to try them.

Henry Butke, Chena, October 15.—I wish to make a statement or report the result of the seed that was sent to me. Brussels sprouts, cabbage, kale, carrots, and ruta-bagas all did very well; in fact, I never saw any better in the States. Parsley, onions, and celery did not do very well. I planted turnips, potatoes, and string beans of some seed that I had, and they were extra fine. In fact the only stuff that did not do well was the onions, parsley, and celery. I hope that you will send the nursery stock as early as possible, so I can get them set to get an early start.

J. F. Karshner, Tanana Hot Springs Farm, September 27.—I will drop you a short report on my crops. I have made a few trials with different plants this year, and they all made a good showing. Tobacco made a great growth. I had leaves over 3 feet long on some plants. Then corn was a success. I had roasting ears that were fine. Some of them were rather harder or more mature than was wanted. Next on the list were muskmelons. I had quite a nice lot that got ripe. Tomatoes were a grand success. The vines were loaded with the finest fruit one could wish, and part of them ripened; the balance I put under sash with glass cover, and we have now been eating ripe tomatoes from them for some weeks. I grew squash of several kinds; some of them weighed 33 pounds, and some of my cabbage weighed 24 pounds. The potatoes were as fine as I ever grew and of the finest flavor, dry and mealy. In fact, all crops are above the average. I sowed the wheat I had and found an improvement that surprised me. Some plants produced as high as 32 heads to one grain. I cut it about August 20 and got 10 fine bundles. I have not thrashed yet, but expect a fine yield; have counted as high as 42 grains to the head. The second year's planting seems to show the same results as potatoes, namely, a larger and earlier crop. We have a flock of chickens—about seventy—and six fine pigs.

SOIL TEMPERATURES.

A record of soil temperatures taken at Sitka and Kenai experiment stations is submitted herewith. A 6-inch thermometer is planted so that the bulb will record the temperature 6 inches below the surface. A 24-inch thermometer in like manner records the temperature of 2 feet below the surface. At Sitka there is in addition a minimum thermometer placed 6 inches above the surface, in order to record the actual temperature at the surface of the ground.

Soil temperatures.

SITKA EXPERIMENT STATION.

Date.	Temperature.			Date.	Temperature.			Date.	Temperature.		
	At 6 inches below surface.	At 24 inches below surface.	Minimum at 6 inches above surface.		At 6 inches below surface.	At 24 inches below surface.	Minimum at 6 inches above surface.		At 6 inches below surface.	At 24 inches below surface.	Minimum at 6 inches above surface.
1906.	° F.	° F.	° F.	1906.	° F.	° F.	° F.	1906.	° F.	° F.	° F.
May 20	49	44.5	35	July 9	54.5	51	40	Aug. 27	56	53	48
May 21	48	45	42	July 10	56	51	49	Aug. 28	56	53	48
May 22	47	45	30	July 11	55	51	44	Aug. 29	56	53	40
May 23	48.5	45	36	July 12	56.5	51.5	51	Aug. 30	56	53	44
May 24	48	45	35	July 13	56	51.5	54	Aug. 31	56	53	47
May 25	49	45.5	37	July 14	56	51.5	51	Sept. 1	56	53	47
May 26	52.5	45.5	50	July 15	55.5	51.5	45	Sept. 2	56	53	43
May 27	53	46	40	July 16	53	52	51	Sept. 3	54	53	44
May 28	52.5	46	46	July 17	53	52	45	Sept. 4	54	53	44
May 29	52.5	46.5	45	July 18	53	52.5	45	Sept. 5	52	53	42
May 30	51	46.5	43	July 19	53	52.5	44	Sept. 6	52	53	44
May 31	51	47	46	July 20	53.5	52.5	45	Sept. 7	52	53	44
June 1	50	48	47	July 21	53.5	52.5	48	Sept. 8	52	53	44
June 2	50	48	59	July 22	53.5	52.5	51	Sept. 9	52	52.5	42
June 3	50	48	55	July 23	53	52	51	Sept. 10	52	52.5	36
June 4	50	48	48	July 24	53	52	51	Sept. 11	52	52	44
June 5	51.5	47.5	45	July 25	53	52	51	Sept. 12	52	52	40
June 6	51.5	47.5	45	July 26	53.5	52.5	49	Sept. 13	52	52	41
June 7	52	47.5	44	July 27	55.5	53	44	Sept. 14	52	52	44
June 8	52	47.5	39	July 28	55.5	53	43	Sept. 15	52	52	44
June 9	52	48	38	July 29	55	53	43	Sept. 16	52	52	41
June 10	52	48	43	July 30	55	53	45	Sept. 17	51	52	32
June 11	52	48	39	July 31	55	53	48	Sept. 18	51	52	31
June 12	52	48	42	Aug. 1	55.5	53	40	Sept. 19	50	51.5	29
June 13	52	48.5	40	Aug. 2	56	53	40	Sept. 20	50	51.5	28
June 14	52	48.5	44	Aug. 3	56	53	49	Sept. 21	48	51.5	27
June 15	52	48.5	35	Aug. 4	56	53	50	Sept. 22	48	51	36
June 16	52.5	48.5	36	Aug. 5	55.5	53	52	Sept. 23	48	50.5	45
June 17	52.5	49	42	Aug. 6	55.5	53	51	Sept. 24	48	50.5	42
June 18	53.5	49	43	Aug. 7	55.5	53	48	Sept. 25	48	50.5	39
June 19	53.5	49	42	Aug. 8	55.5	53	46	Sept. 26	48	50	37
June 20	53	49	34	Aug. 9	55.5	53	50	Sept. 27	48	49.5	40
June 21	53	49	36	Aug. 10	55.5	53	48	Sept. 28	48.5	48	37
June 22	53	49	38	Aug. 11	55.5	53	46	Sept. 29	47	48	45
June 23	53	49.5	43	Aug. 12	55.5	53	48	Sept. 30	49	49.5	44
June 24	52	49.5	40	Aug. 13	55.5	53	44	Oct. 1	49	49.5	32
June 25	51	49.5	42	Aug. 14	55	53	44	Oct. 2	48	49.5	37
June 26	51	49.5	42	Aug. 15	55	53	44	Oct. 3	48	49.5	39
June 27	51.5	49.5	35	Aug. 16	55	53	44	Oct. 4	47.5	49	37
June 28	53	49.5	45	Aug. 17	55.5	53	45	Oct. 5	47	49	35
June 29	53	49.5	43	Aug. 18	55.5	53	44	Oct. 6	47	49	34
July 1	53.5	50	49	Aug. 19	56	53	31	Oct. 7	47	49	39
July 2	54.5	50	46	Aug. 20	56	53	46	Oct. 8	47	49	40
July 3	55	50	39	Aug. 21	56	53	48	Oct. 9	47.5	49.5	44
July 4	54	50.5	37	Aug. 22	56	53	44	Oct. 10	48	49.5	43
July 5	54.5	50.5	35	Aug. 23	56	53	41	Oct. 11	48	49.5	42
July 6	55	50.5	38	Aug. 24	56	53	44	Oct. 12	48	49.5	40
July 7	55	50.5	37	Aug. 25	56	53	46				
July 8	55	50.5	37	Aug. 26	56	53	48				

Soil temperatures—Continued.

KENAI EXPERIMENT STATION.

Date.	Temperature.		Date.	Temperature.		Date.	Temperature.	
	6-inch thermometer.	24-inch thermometer.		6-inch thermometer.	24-inch thermometer.		6-inch thermometer.	24-inch thermometer.
1906.	°F.	°F.	1906.	°F.	°F.	1906.	°F.	°F.
May 17	40	.....	July 2	52.5	42.5	Aug. 17	56	48.5
May 18	40	.....	July 3	54	42.5	Aug. 18	56.5	48.5
May 19	41	.....	July 4	53	42.5	Aug. 19	53	48.5
May 20	41	.....	July 5	52	42.5	Aug. 20	54	49
May 21	41	.....	July 6	50.5	42.5	Aug. 21	53.5	49
May 22	43.5	.....	July 7	53	43	Aug. 22	53	49
May 23	43	.....	July 8	55.5	43	Aug. 23	54	48.5
May 24	42.5	.....	July 9	56.5	43	Aug. 24	52.5	48.5
May 25	46	.....	July 10	56	43	Aug. 25	53	48.5
May 26	46	.....	July 11	54	43.5	Aug. 26	55	48.5
May 27	48.5	.....	July 12	53	44	Aug. 27	55	48.5
May 28	44.5	.....	July 13	52	44	Aug. 28	53	48.5
May 29	46.5	.....	July 14	53	44	Aug. 29	51.5	48.5
May 30	45.5	.....	July 15	52.5	44	Aug. 30	52.5	48.5
May 31	45.5	.....	July 16	52.5	44	Aug. 31	50.5	48.5
June 1	43.5	32.5	July 17	51.5	44	Sept. 1	49.5	48
June 2	45	32.5	July 18	55	44.5	Sept. 2	51.5	48
June 3	46	32.5	July 19	54.5	45	Sept. 3	51	48
June 4	46	33	July 20	54.5	45.5	Sept. 4	51	48
June 5	46	33.5	July 21	56	45.5	Sept. 5	50.5	48
June 6	47	34	July 22	56	45.5	Sept. 6	51	47.5
June 7	43.5	34.5	July 23	54.5	46	Sept. 7	51	47.5
June 8	46	35	July 24	54	46.5	Sept. 8	51.5	47.5
June 9	52.5	35.5	July 25	54.5	46.5	Sept. 9	50.5	47.5
June 10	52.5	35.5	July 26	55.5	46.5	Sept. 10	49.5	47.5
June 11	52.5	36.5	July 27	56.5	47	Sept. 11	48.5	47.5
June 12	51	36.5	July 28	55	47	Sept. 12	49.5	47
June 13	48.5	36.5	July 29	55	47	Sept. 13	48	47
June 14	47	38	July 30	54	47	Sept. 14	49.5	47
June 15	49.5	38	July 31	54.5	47	Sept. 15	49.5	47
June 16	51	38.5	Aug. 1	54.5	47.5	Sept. 16	49	47
June 17	51.5	38.5	Aug. 2	53.5	47.5	Sept. 17	48.5	47
June 18	52	39	Aug. 3	53	47.5	Sept. 18	47.5	46.5
June 19	49	39	Aug. 4	52	47.5	Sept. 19	47	46.5
June 20	48	39.5	Aug. 5	52	47.5	Sept. 20	48.5	46.5
June 21	52	39.5	Aug. 6	52	47.5	Sept. 21	47.5	46
June 22	51.5	39.5	Aug. 7	54	47.5	Sept. 22	46	46
June 23	51	40	Aug. 8	53.5	47.5	Sept. 23	45	46
June 24	52.5	40	Aug. 9	51	47.5	Sept. 24	44	45
June 25	52.5	40.5	Aug. 10	51.5	47.5	Sept. 25	43.5	45
June 26	51.5	40.5	Aug. 11	54	47.5	Sept. 26	43	45
June 27	54	41	Aug. 12	54.5	47.5	Sept. 27	42	44.5
June 28	55	41	Aug. 13	55	47.5	Sept. 28	42	44
June 29	57	41.5	Aug. 14	56	47.5	Sept. 29	42.5	43.5
June 30	55	42	Aug. 15	57	48	Sept. 30	42	43
July 1	54.5	52.5	Aug. 16	56	48			

METEOROLOGICAL OBSERVATIONS.

The following data are condensed from the monthly reports of the stations named. It would be impracticable to publish the full data on account of their bulk, but the essential facts are given in the record submitted herewith. The first column shows the highest and the second column the lowest temperature reached during the month. The third column shows the daily mean for the month; that is to say, it is the average temperature of both the highest and lowest daily readings throughout the month. The fourth column gives the amount of rainfall in inches each month, and in the succeeding four columns it is attempted to give an idea of the character of the weather, by

giving the number of clear, partly cloudy, cloudy, and rainy days for the month. A careful study of these data will convey a fairly accurate idea of the climatic conditions at any one of the stations named. The military stations ceased to send reports to the writer in the middle of the summer and hence the data are not complete for those stations.

Meteorological observations.

SITKA. R. W. De Armond, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1905.	°F.	°F.	°F.	*Inches.*				
October	57	28	45.74	7.03	8	5	18	17
November	60	19	41.93	11.37	3	9	18	21
December	49	23	38.03	11.21	2	4	25	21
1906.								
January	48	− 2	26.10	7.25	11	1	19	12
February	50	22	37.28	1.89	16	3	9	6
March	55	21	39.03	1.58	17	3	11	6
April	59	31	41.93	10.63	3	10	17	25
May	75	31	47.82	3.46	7	11	13	15
June	65	34	55.39	3.34	9	10	11	16
July	69	40	54.91	7.45	11	1	19	15
August	65	43	54.79	4.66	9	3	19	16
September	66	33	52.35	5.78	6	4	20	20
October	65	34	46.57	15.22	1	6	24	25
November	51	25	39.7	15.59	5	9	16	22

KENAI. P. H. Ross, observer.

1905.								
October	54	12	38.07	2.92	8	6	17	16
November	45	4	32.21	2.16	8	2	20	17
December	40	−24	16.75	.45	9	3	19	9
1906.								
January	33	−42	− 3.98	.25	19	5	7	4
February	38	−15	20.72	.10	14	5	9	1
March	48	1	26.48	.95	20	2	9	4
April	61	− 5	35.62	.08	15	11	4	3
May	79	22	44.83	.29	18	4	9	3
June	75	32	52.25	.57	15	2	13	7
July	70	34	52.93	4.41	7	6	18	17
August	72	31	53.72	2.95	4	13	14	16
September	70	21	47.84	1.41	12	6	12	10
October	53	10	38.1	1.74	9	2	20	8

COPPER CENTER. J. W. Neal, observer.

1905.								
October	49	− 3	27.70	.97	9	8	14	8
November	48	−10	25.13	.94	6	11	13	7
December	32	−33	− 1.95	.97	4	7	20	12
1906.								
January	32	−74	−24.43	1.14	18	4	9	7
February	24	−31	− 5.26	.19	14	4	10	3
March	39	−15	15.30	.85	12	.....	19	5
April	59	−17	28.76	.36	5	13	12	4
May	77	20	48.57	.43	10	10	11	6
June	81	26	53.23	1.59	8	5	17	10
July	81	32	52.64	2.14	4	15	12	10
August	69	26	52.46	.69	15	5	11	5
September	63	14	42.55	.39	10	7	13	6

Meteorological observations—Continued.

RAMPART. Fred E. Rader, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1905.	°F.	°F.	°F.	*Inches.*				
October	49	− 8	19.56	1.20	8	6	17	10
November	37	−29	6.87	1.43	3	3	24	10
December	13	−56	−16.90	.34	14	3	14	3
1906.								
January	5	−66	−36.84	.63	16	1	14	7
February	19	−40	− 5.16	.08	12	6	10	4
March	51	−31	14.66	.17	6	11	14	5
April	65	−21	21.10	.04	17	9	4	1
May	79	18	46.93	.40	14	9	8	4
June	84	33	62.24	.15	11	13	6	3
July	83	34	59.10	1.86	6	9	16	10
August	82	25	55.35	2.40	6	9	16	9

FORTMAN SALMON HATCHERY. Fred Patching, observer.

1905.								
November	53	10	39.51	35.93	4	4	22	24
December	44	15	34.41	24.71	.....	4	27	25
1906.								
January	47	−12	25.00	21.70	3	6	22	24
February	53	16	33.75	6.08	10	4	14	12
March	59	16	38.24	9.64	18	1	12	13
April	59	26	41.93	25.06	1	6	23	29
May	77	28	50.78	7.93	5	15	11	19
June	69	36	53.16	10.09	1	18	11	29
July	82	40	57.05	4.99	11	8	12	16
August	78	41	56.00	15.21	6	6	19	22
September	61	34	47.65	18.63	2	8	20	24
October	57	31	43.36	20.49	.....	6	25	29

KILLISNOO. Joseph Zuboff, observer.

1905.								
November	60	17	39.33	8.40	6	1	23	19
December	46	19	36.09	7.75	.....	3	28	25
1906.								
January	45	− 7	21.43	6.90	7	4	20	20
February	45	16	31.74	2.70	13	3	12	10
March	49	21	36.93	.90	16	5	10	6
April	55	28	40.71	5.15	1	7	22	17
May	70	32	48.09	1.25	13	10	8	6
June	67	42	53.45	2.85	2	17	11	10
July	68	45	54.30	3.80	8	10	13	12
August	68	45	54.19	4.90	5	6	20	13
September	60	35	47.88	4.70	1	2	27	22
October	65	33	44.89	8.40	2	15	14	15
November	51	25	36.73	9.55	3	2	25	18

JUNEAU. I. J. Sharick, observer.

1905.								
September	68	34	51.19	3.63	7	.....	23	23
November	59	7	41.58	15.44	7	.....	23	23
December	47	21	36.37	10.30	5	.....	26	27
1906.								
January	47	−10	23.14	3.60	18	.....	13	16
February	45	19	35.10	2.65	19	.....	9	9
March	59	22	42.54	.92	23	.....	8	7
April	56	29	44.83	3.03	1	23	6	29
May	80	35	54.82	3.93	13	.....	18	18
June	81	39	60.78	7.57	8	.....	22	21
July	77	58	57.73	3.98	7	7	17	17
August	72	39	55.20	6.63	17	.....	14	24
October	68	38	48.23	12.75	4	.....	27	27

Meteorological observations—Continued.

SKAGWAY. H. D. Clark, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1905.	°F.	°F.	°F.	*Inches.*				
November	56	17	36.92	4.45	5	6	19	14
December	42	9	29.95	2.21	4	1	26	11
1906.								
January	42	−21	13.86	.....	11	7	13	.....
February	38	15	28.07	1.16	16	.....	12	5
March	52	22	36.33	.57	18	7	6	4
April	56	28	41.36	3.55	2	19	9	14
May	79	36	55.15	.37	8	18	5	4
June	76	35	55.23	2.63	7	18	5	9
July	74	40	51.00	2.11	7	13	11	7
August	65	35	53.20	2.26	2	18	11	16
September	64	26	48.66	1.30	5	19	6	8
October	63	30	43.96	5.56	2	11	18	20

ORCA. W. J. Shepard, observer.

1905.								
November	50	26	37.68	29.64	3	7	20	25
December	49	15	21.33	12.64	2	7	22	26
1906.								
January	40	2	20.67	10.63	13	4	14	15
February	45	16	30.01	.94	15	3	10	5
March	59	22	37.01	5.34	14	5	12	12
April	63	23	38.34	7.54	4	8	18	16
May [a]	75	29	45.20	5.60	7	7	8	4

FORT LISCUM. First Lieut. C. J. Stedman, observer.

1905.								
November	39	21	31.85	10.32	9	5	16	19
December	39	4	24.35	7.85	13	6	12	19
1906.								
January	36	−8	12.49	12.53	19	3	9	13
February	38	7	24.00	1.83	20	5	3	6
March	44	18	31.22	7.54	18	.....	13	13
April	48	18	35.38	4.20	18	6	6	12
May	71	28	44.04	1.36	24	4	3	9
June	74	36	50.80	4.01	14	8	8	16
July	66	39	50.47	7.12	5	3	23	22
August	64	35	51.01	8.46	12	7	12	19
September	68	29	46.19	4.11	15	2	13	12

WOOD ISLAND. S. A. Coldwell, observer.

1905.								
October [b]	52	31	41.82	6.80	5	.....	20	8
November	49	28	38.09	8.00	6	.....	24	15
December	61	12	32.17	1.88	10	.....	21	8
1906.								
January	51	.....	22.65	2.50	11	.....	20	4
February	56	25	39.10	8.60	2	.....	26	17
March	46	6	35.93	3.50	15	.....	16	6
April	54	21	38.61	3.80	6	.....	24	9
May	74	32	45.60	5.10	12	.....	19	7
June [c]	.....	.....	.....	.....	.....	.....	.....	.....
July	72	42	55.40	4.70	10	.....	21	13
August [d]	71	41	53.90	9.20	1	.....	21	12
September	64	38	51.66	1.50	12	.....	18	5
October	59	31	44.51	6.70	7	.....	24	12

[a] For twenty-one days only.
[b] Twenty-five days only for October, 1905.
[c] June missing.
[d] Twenty-two days only for August, 1906.

Meteorological observations—Continued.

TYONEK. Durell Finch, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1905.	°F.	°F.	°F.	*Inches.*				
October	58	22	38.70	3.19	7	3	21	11
November	47	10	33.43	3.10	9	.....	21	10
December	41	−14	19.98	1.24	9	5	17	6
1906.								
January	35	−27	.72	.65	21	2	8	6
February	41	− 6	23.51	.47	19	1	8	2
March	49	10	29.16	1.32	19	.....	12	4
April	53	11	37.44	.77	15	3	12	5
May	74	26	31.86	.39	19	3	9	3
June	71	34	51.98	1.00	14	6	10	6
July	74	42	56.64	2.96	10	4	17	8
August	74	41	56.48	2.94	7	3	21	10
September	74	29	50.41	1.67	15	.....	15	5

SUNRISE. A. Lawson, observer.

1905.								
October	53	21	37.30	4.36	5	4	22	21
November	50	7	32.81	9.47	4	7	23	24
December	44	−14	19.97	8.45	9	4	18	12
1906.								
January	41	−29	− .82	2.18	18	3	10	12
February	51	−10	24.18	.29	17	4	7	4
March	52	8	26.96	4.13	12	3	16	14
April	54	6	34.43	1.17	6	6	18	17
May	76	25	44.99	2.35	14	7	10	17
June	76	35	52.15	2.46	9	9	12	16
July	69	36	53.15	1.84	2	8	21	19
August	68	36	52.69	3.70	2	9	20	26
September	64	27	45.74	1.54	4	12	14	11
October	54	18	38.07	6.67	2	2	27	20

COAL HARBOR. Henry S. Tibbey, observer.

1905.								
October	58	30	43.24	3.30	6	14	11	12
November	54	21	38.40	9.25	8	6	16	17
December	42	12	28.61	5.08	14	7	10	13
1906.								
January	41	1	21.97	2.33	16	4	11	8
February	43	19	35.53	5.41	4	2	22	21
March	48	.....	31.22	6.46	8	10	13	14
April	50	19	36.19	2.61	7	8	15	19
May	64	25	41.74	4.07	6	9	16	16
June	69	37	49.46	1.01	15	12	3	7
July	67	38	51.60	3.18	6	9	16	14
August	69	38	52.40	4.28	3	16	12	18
September	62	35	48.96	3.42	3	16	11	14
October	57	31	43.02	4.44	6	12	13	17

DUTCH HARBOR. F. Schroder, observer.

1905.								
October	56	28	41.67	5.00	6	.....	25	15
November	55	24	37.34	13.78	3	.....	27	15
December	44	16	30.51	3.76	3	.....	28	20
1906.								
January	46	10	26.56	.71	5	.....	26	11
February	41	15	33.93	9.46	.....	.....	28	20
March	50	7	31.36	12.19	9	.....	22	20
April	48	22	35.23	3.07	12	10	8	12
May	50	28	38.95	6.82	10	.....	21	11
June	54	37	44.05	1.14	3	1	26	4
July	61	39	48.43	3.56	2	9	20	12
August	61	37	49.08	3.10	1	11	19	10
September	61	34	48.69	2.29	1	4	25	15

Meteorological observations—Continued.

SUMMIT. G. A. L. Geraway, observer.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1905.	°F.	°F.	°F.	*Inches.*				
August	97	35	54.90	3.73	6	13	12	19
September[a]								
October[b]								
November	38	−22	19.34	1.53	6	11	13	12
December	19	−37	.32	.46	14	14	3	3
1906.								
January	[illegible]	−49	−17.51	1.19	20	1	8	9
February	30	−25	9.61	.46	12	5	9	3
March	40	− 3	23.67	1.04	8	10	13	7
April	46	1	26.89	1.26	14	6	6	7
May	73	31	48.54	1.02	12	12	7	9
June	80	41	60.91	4.25	8	14	8	18

TEIKHILL. Joseph H. Embleton, observer.

1905.								
October	52	9	31.18	1.48	8	.....	23	8
November	45	− 6	23.16	4.90	11	3	16	12
December	37	−25	5.23	2.33	9	5	16	16
1906.								
January	36	−45	−10.06	2.50	12	4	15	12
February	27	−19	4.82	.20	16	2	10	3
March	45	−11	20.40	1.87	14	4	13	10
April	53	−10	31.41	.58	4	3	23	2
May	81	15	44.75	.25	12	.....	19	4
June	86	27	53.10	1.39	9	1	20	13

KENNETT. Oscar Sall, observer.

1905.								
August	81	.....	.....	.....	11	5	15	.....
September	69	.....	.....	.....	14	.....	15	.....
October	58	.....	.....	.....	14	.....	17	.....
November	46	.....	.....	.....	11	.....	19	.....
December	27	.....	.....	.....	10	2	19	.....
1906.								
January	33	.....	.....	.....	18	3	10	.....
February	39	.....	.....	.....	20	.....	8	.....

CHESTOCHINA. J. L. Miller, observer.

1905.								
October	46	− 2	25.83	1.68	11	14	6	7
November	45	−11	21.23	.03	3	3	19	1
December[c]	20	−30	1.04	.75	4	4	20	4
1906.								
January	25	−55	−15.86	.26	16	2	13	1
February	28	−25	− 2.78	.06	16	4	8	3
March	.....	− 3	.....	.03	20	5	6	2
April	56	15	34.66	.....	15	6	9	.....
May	76	28	47.28	.....	18	7	6	.....
June	78	36	55.23	1.62	17	5	8	3

CENTRAL. Glenn Young, observer.

1905.								
August	72	25	49.80	2.08	8	12	11	16
September[a]	.....	.....	.....	.....	.....	.....	.....	.....
October	.....	−14	.....	2.61	13	5	11	5
November	.....	−25	.....	.77	9	9	10	6
December	.....	−50	.....	.35	18	8	2	3

[a] September missing. [b] October missing. [c] 28 days for December only.

Meteorological observations—Continued.

CENTRAL. Glenn Young, observer—Continued.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	*Inches.*				
January		−60		.56	17	2	10	4
February		−37		.06	14	7	7	1
March		−15		.05	14	6	11	1
April		−15		.15	20	1	9	5
May		21		.66	15	11	5	3
June		34		4.91	11	11	8	16
July		32		4.82	11	17	3	14

TANANA CROSSING. Fred E. Stuard, observer.

1905.								
October	67	− 3	29.34	.59	6	12	13	3
November	38	−12	10.70	.60	6	17	7	2
December	16	−42	−11.94	1.00	6	20	5	1
1906.								
January	10	−69	−34.00	.01	10	7	14	1
February [a]								
March	42	−13	16.70		18	6	7	
April	66	18	42.43		17	4	9	
May [a]								
June	89	42	67.93	6.00	16	1	13	2

KETCHEMSTUCK. Edward Storbeck, observer.

1905.								
October	43	−18	16.38	.41	10	17	4	4
November	28	−35	1.85	.30	6	11	13	4
December	12	−51	−17.62	.20	15	2	14	2
1906.								
January [b]	20	−50	−27.35	.36	10		8	3
February	12	−46	−11.75		15	1	12	
March	40	−27	8.79	.06	14	7	10	1
April	54	−25	22.88	.27	15	2	13	3
May	76	11	43.41	1.69	13	10	8	6
June	83	29	54.00	1.61	18	1	11	8

NORTH FORK. Harry E. Simmons, observer.

1905.								
August	84	25	53.35	1.91	7	9	15	8
September	68	15	38.81	1.96	9	5	16	6
October	44	−17	20.92	.90	11	2	18	6
November	30	−17	14.72	.14	6		24	5
December	17	−50	−14.73	.02	14		17	2
1906.								
January	16	−67	−26.73	.70	20		11	3
February [c]		−49		.50	16	3	9	3
March		−23		.01	20	2	9	1
April		−18		.80	18	3	9	2
May		28		1.98	9	9	13	9
June		36		2.74	10	12	8	10

FAIRBANKS. Archdeacon Hudson Stuck, observer.

1905.								
September	59	18	37.86	.93	8	2	20	10
October	46	− 8	23.31	4.77	8	6	17	7
November	39	−25	8.47	.11	7	11	12	5
December	33	−55	15.81	.62	1	16	14	4

[a] February and May missing.
[b] 18 days only for January.
[c] Maximum thermometer broken.

Meteorological observations—Continued.

FAIRBANKS. Archdeacon Hudson Stuck, observer—Continued.

Month.	Temperature.			Total precipitation.	Weather conditions (number of days).			
	Maximum.	Minimum.	Daily mean.		Clear.	Partly cloudy.	Cloudy.	Rain or snow.
1906.	°F.	°F.	°F.	*Inches.*				
January	13	−65	−36.55	1.66	4	15	12	9
February	21	−38	.18	2.61	.....	22	6	4
March	46	−22	18.06	.32	2	23	6	2
April	57	−20	25.49	.05	28	1	1	2
May	81	27	49.30	.36	16	6	9	5
June	84	38	60.40	.94	16	9	5	6
July	83	40	60.30	2.82	12	12	7	17
August	77	32	55.56	1.50	14	12	5	15
September	70	13	43.93	.25	12	17	1	7

FORT GIBBON. Chas. W. H. Heideman, observer.

1905.								
September	56	15	35.89	.59	10	.....	20	4
October	42	− 2	19.38	.50	12	.....	19	4
November	36	−30	10.00	1.10	12	.....	18	4
December	16	−63	−16.00	.18	16	.....	15	1
1906.								
January	6	−71	−36.70	.65	21	.....	10	3
February	32	−41	.86	.20	17	.....	11	2
March	40	−22	16.47	.30	16	.....	15	2
April	55	−15	23.50	.....	30	.....	.....	.....
May	73	21	44.51	1.00	24	.....	7	1

FORT GIBBON. First Lieut. R. H. Pierson, observer.

1905.								
September	55	16	33.27	.89	10	.....	20	7
October	41	− 4	21.75	.95	14	3	14	7
November	33	−29	9.61	1.80	18	.....	12	7
December	12	−59	−16.48	.70	22	.....	9	5

FORT EGBERT. Herman B. Olson, Signal Corps, observer.

1905.								
October	63	47	29.54	2.96	2	13	16	5
November	42	3	17.14	.93	15	3	12	4
December	24	−23	5.75	.68	15	.....	16	1
1906.								
January [a]	.....	.....	.....	.....	.....	.....	.....	.....
February	46	−30	13.00	.14	19	4	5	1
March	51	−11	27.51	2.19	14	9	8	4
April	54	.....	24.31	.....	12	1	7	.....
May	84	28	59.12	.54	11	9	11	11
June	92	78	70.73	.51	12	9	9	8

HOLY CROSS MISSION. Brother Constantine, observer.

1905.								
October	44	5	27.83	.42	6	5	20	6
November	39	− 8	16.50	2.00	8	7	15	6
December	34	−48	− 9.53	1.35	16	6	9	4
1906.								
January	25	−52	−24.35	1.72	23	.....	8	5
February	41	−21	7.05	.78	15	.....	13	5
March	45	−19	20.32	1.26	11	2	18	9
April	54	−10	23.39	.09	21	7	2	2
May	76	14	43.96	.22	21	4	6	1
June	77	38	57.70	1.52	22	7	1	9
July	72	37	55.33	1.37	17	9	5	11
August	69	34	53.17	3.12	9	8	14	20

[a] January missing.